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(54) Title: EMBRYONIC CEREBROSPINAL FLUID (E-CSF), PROTEINS FROM E-CSF, AND RELATED METHODS AND COMPOSITIONS

(57) Abstract: We have performed a proteomic analysis of embryonic cerebrospinal fluid (e-CSF) in human and rats. Based on this discovery, the invention features methods and compositions for cell culture including components of e-CSF or fragments thereof. Also provided are methods for extraction of e-CSF.



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EMBRYONIC CEREBROSPINAL FLUID (e-CSF), PROTEINS FROM e-CSF, AND RELATED METHODS AND COMPOSITIONS

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Background of the Invention

During the process of neurulation the neural groove forms and the neural folds fuse to form the neural tube. Once the neural tube is fused, the fluid within the lumen is considered cerebrospinal fluid, whereas before fusion is complete the neuroepithelium lining the inside of the neural tube is still in contact with amniotic fluid. During the early stages of neural tube growth and development, groups of specialized neuroepithelial cells lining the neural tube are believed to secrete fluid into the neural tube space in order to support growth and development of the embryo. As the neural tube continues to elongate and develop, specific highly vascularized epithelial cell types begin to invaginate at specific locations within the neural tube to form the specialized choroid plexus.

The choroid plexus is a highly vascularized epithelial cell structure that during development may be involved in the specific intracellular transfer of proteins into the CSF from the blood (Saunders et al., Cell Mol Neurobiol, 2000. 20:29-40). The choroid plexus develops in the lateral ventricles and in the third and fourth ventricles of the brain. In rats, the choroid plexus can be first identified as early as embryonic day 13 (E13) as a midline structure and by E15 it represents paired structures protruding into the lateral ventricles. In the human embryo the choroid plexus begins to develop in the lateral and fourth

ventricle at Carnegie Stage (CS) 18, approximately 44 days post-ovulation.

The first appearance of cerebral cortical neurons in the human embryo occurs at CS 21, shortly following the appearance of the choroid plexus and the production of CSF, and a similar temporal sequence is seen in mice and rats.

5 In adults, CSF has many functions, including an intermediary between blood and brain for the transport of nutrients and growth factors and as a fluid buffer for the brain to protect both the brain and the large vessels that supply blood to the brain (Chodobski et al., *Microsc Res Tech*, 2001. 52:65-82; Emerich et al., *Bioessays*, 2005. 27:262-74). It may also be involved in
10 elimination of toxins and other metabolic byproducts (Emerich et al., *Bioessays*, 2005. 27:262-74; Miyan et al., *Can J Physiol Pharmacol*, 2003. 81:317-28). A mathematical analysis taking into account the pulsatile nature of CSF flow suggested that the CSF pulsations buffer the capillary bed from the effects of arterial pulsations that might otherwise prevent linear blood flow due
15 to the mechanics of the brain being enclosed in the skull (Miyan et al., *Can J Physiol Pharmacol*, 2003. 81:317-28). CSF contains nerve growth factor (NGF), transforming growth factor alpha (TGF-alpha); levels of these proteins are altered in neurological and developmental disorders (Miyan et al., *Can J Physiol Pharmacol*, 2003. 81:317-28; Kasaian et al., *Biofactors*, 1989. 2:99-
20 104; Massaro et al., *Ital J Neurol Sci*, 1994. 15:105-8; Patterson et al., *Brain Res*, 1993. 605:43-9; Van Setten et al., *Int J Dev Neurosci*, 1999. 17:131-4), but potential functions of these factors has not been demonstrated. Recently it was shown that the ciliary action of CSF in the lateral ventricle of adult rats creates a gradient of SLIT2 protein, a chemorepulsive factor for neuronal olfactory
25 bulb migration, within the CSF (Sawamoto et al., *Science*, 2006. 311:629-32), suggesting that CSF factors might have instructive roles for developing neurons or neural progenitors.

 Although the role of the CSF during embryogenesis is just starting to be studied, an important role has been suggested in brain development (Miyan et
30 al., *Can J Physiol Pharmacol*, 2003. 81:317-28; Gato et al., *Anat Rec A Discov*

Mol Cell Evol Biol, 2005. 284:475-84; Martin et al., Dev Biol, 2006. 297:402-16; Mashayekhi et al., Brain, 2002. 125:1859-74; Miyan et al., Cerebrospinal Fluid Res, 2006. 3:2; Owen-Lynch et al., Brain, 2003. 126:623-31). Miyan et al. have shown that rat cortical cells are viable and proliferate in e-CSF (Miyan et al., Cerebrospinal Fluid Res, 2006. 3:2). Other studies have tested discrete signaling factors that may regulate neurogenesis. Gato et al. and Martin et al. have studied the role of chick e-CSF in regulating survival, proliferation, and neurogenesis of neuroepithelial cells, and have identified FGF-2 in the chick CSF as a vital trophic factor (Gato et al., Anat Rec A Discov Mol Cell Evol Biol, 2005. 284:475-84; Martin et al., Dev Biol, 2006. 297:402-16). Intriguingly, in mutant animals, CSF factors that may inhibit proliferation have been suggested. In studies of the hydrocephalic Texas (H-Tx) rat, cell proliferation in the ventricular zone decreases, and although cell migration still occurs, there is a decrease in the number of migrating cells (Mashayekhi et al., Brain, 2002. 125:1859-74; Miyan et al., Cerebrospinal Fluid Res, 2006. 3:2). In addition, CSF from the lateral ventricles of affected H-Tx fetuses can completely inhibit in vitro proliferation of neuronal progenitors isolated from a normal fetus at 10% CSF addition to the media, suggesting that factors intrinsic to the CSF of the H-Tx fetuses are present that inhibit proliferation.

Prior to the present invention, the identification of such CSF factors with a developmental role has been impeded, as the components of the CSF were previously not known. While a first glimpse of the protein composition of e-CSF has been provided, a (Parada et al., Proteomics, 2006. 6:312-20; Parada et al., J Proteome Res, 2005. 4:2420-8), a complete analysis of the contents of e-CSF would be allow for identification of proteins important for neural developmental and differentiation.

Summary of the Invention

We have developed methods for isolating embryonic cerebrospinal fluid (e-CSF) and have identified the proteins found in rat and human e-CSF.

On this basis, the invention features a method of isolating embryonic cerebrospinal fluid (e-CSF). As e-CSF is capable of supporting the culture of developing neural cells, the invention also features methods of culturing cells in the presence of various components of the e-CSF, as well as compositions including cells and e-CSF component(s).

In a first aspect, the invention features a composition including at least one (e.g., at least 2, 3, 4, 5, 6, 8, 10, 15, 25, 50, 75, or 100) component(s) of e-CSF (e.g., rat, mouse, or human). The composition may include the component or components at an enhanced level relative to the level in e-CSF and the composition is capable of supporting proliferation, maintenance, or differentiation of a cultured cell (e.g., a stem cell or progenitor cell such as neural cell). The component may be a polypeptide, or a functional fragment thereof (e.g., a soluble fragment). The polypeptide may be isolated, purified, or produced recombinantly. The component may be present at a level sufficient to enhance cell proliferation, maintenance, or differentiation, as compared to in the absence of the component. The component may be one that is not found in adult CSF.

The invention also features a cell culture composition including a cell (e.g., any described herein) and a composition of the first aspect.

The invention also features a kit including (a) a composition including at least one component of e-CSF, wherein the component is present at an enhanced level relative to naturally occurring e-CSF (e.g., the compositions described above); and (b) instructions for using (a) for cell culture.

In another aspect, the invention features a method of culturing a cell (e.g., a stem cell or a progenitor cell, such as a neural cell), including incubating the cell in culture media containing at least one isolated component of rat or human e-CSF (e.g., any of the compositions of the first aspect of the invention). The component may be a polypeptide, or a functional fragment thereof (e.g., a soluble fragment). The polypeptide may be isolated, purified, or

produced recombinantly. In certain embodiments, the component is one which is not found in adult CSF.

In any of the above aspects, the e-CSF component may be one described in Tables 1-4.

5 In another aspect, the invention features a method of isolating embryonic cerebrospinal fluid (e-CSF) including (a) providing an embryo; (b) inserting a capillary needle into a ventricle of the central nervous system of the embryo such that the tip of the needle contacts CSF; and (c) extracting CSF from the embryo through the needle (e.g., a microcapillary pipette or syringe), thereby
10 isolating e-CSF. The method may further include (d) removing intact contaminating cells (e.g., by filtration or centrifugation). Step (c) may be performed such that the needle tip does not contact the neuroepithelium during the extraction. The e-CSF may be removed from a lateral ventricle or from the third or fourth ventricle of the embryo, or a combination thereof. The method
15 may further include storing the e-CSF at less than about 0-20 °C to about -80, -90, -100, -150 °C.

By “isolated” is meant, with respect to a naturally occurring compound (e.g., a polypeptide), that the compound is at least partially free from the components (e.g., other polypeptides, nucleic acids, cell membranes) with
20 which it naturally is found.

By “purified” is meant, with respect to a compound (e.g., a polypeptide), that the compound makes up at least 20% (e.g., at least 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%, or 99%) of the composition with which is it found.

By “enhanced level” of a component is meant that the component is
25 present either a higher concentration (e.g., at least 10%, 25%, 50%, 100%, 250%, 500%, or 1000% greater) or at higher purity level (e.g., with 5%, 10%, 25%, 50%, or 75% less by mass other components, not including solvents or buffers) relative to the concentration or purity of the component in a control composition (e.g., a naturally occurring composition).

By “stem cell” is meant a self-renewing cell that is capable of differentiation into multiple mature cell types (e.g., a neuron, glial cell, or astrocyte).

By “progenitor cell” (e.g., neural progenitor cells) is meant a cell that is
5 capable of forming at least one cell type has at least some capacity for self-renewal.

Other features and advantages of the invention will be apparent from the following Detailed Description, the drawings, and the claims.

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Brief Description of the Drawings

Figures 1A-1C are a set of images showing extraction and SDS-PAGE analysis of human and rat embryonic CSF. Figure 1A is an image of hematoxylin and eosin sagittal section of E14.5 rat showing CSF aspiration technique and the position of the syringe needle relative to surrounding tissues
15 in the lateral ventricle (LV) and the 4th ventricle (4th V). The inset image of E14.5 rat embryo provides orientation. The arrow head is 4th V, and the arrow is the mouth/chin. Figure 1B shows CSF aspirated from the 4th ventricle of a CS20 human embryo (CS20) and a CS19 human embryo (CS19) separated by size using SDS-PAGE on a 7.5% or 10% polyacrylamide gel respectively. For
20 clarity, the CS20 sample shows 1/7th of the sample used in the final analysis. Figure 1C shows CSF aspirated from the lateral ventricles (LV) of E12.5, E14.5 and E17.5 rat. The arrow in all samples represents Apolipoprotein-B.

Figures 2A-2D are graphs showing classification and comparison of proteins based on subcellular localization. Graphic representation of the
25 subcellular localization of proteins in CS 20 embryonic human CSF (Figure 2A), embryonic rat CSF (Figure 2B), and E16.5 mouse brain (Figure 2C) is shown. The percentage of protein localization is calculated based on the total number of proteins localized to each space divided by the total number of proteins in the CSF that we were able to assign localization (human CSF-187
30 proteins, rat CSF-137 proteins, and mouse brain-179 proteins). Some proteins

were localized to multiple compartments within the cell. Figure 2D shows a comparison between human CSF, rat CSF, and mouse brain of the number of protein from each category based on localization.

Figure 3 is a graph showing comparison of proteins based on molecular function. Proteins present in embryonic human CSF, embryonic rat CSF, and embryonic mouse brain were analyzed using the Panther gene ontology database and classified according to molecular function. The chart includes protein category name. Percentage is calculated from the number of proteins assigned to each category over total number of proteins analyzed.

Figure 4 is a graph showing comparison of proteins based on biological process. Proteins present in embryonic human CSF, embryonic rat CSF, and embryonic mouse brain were analyzed using the Panther gene ontology database and classified according to the biological process with which the proteins are involved. The chart includes protein category name. Percentage is calculated from number of proteins assigned to each category over total number of proteins analyzed.

Figures 5A-5C are graphs showing classification of proteins based on molecular function. Proteins present in embryonic human CSF (Figure 5A), embryonic rat CSF (Figure 5B), and embryonic mouse brain (Figure 5C) were analyzed using the Panther gene ontology database and classified according to molecular function. Each graph includes protein category name, number of proteins assigned to each category, and percentage of proteins assigned to each category. Proteins can be assigned to more than one category based on molecular function.

Figures 6A-6C are graphs showing classification of proteins based on biological process. Proteins present in embryonic human CSF (Figure 6A), embryonic rat CSF (Figure 6B), and embryonic mouse brain (Figure 6C) were analyzed using the Panther gene ontology database and classified according to the biological process the proteins are involved with. Each graph includes protein category name, number of proteins assigned to each category, and

percentage of proteins assigned to each category. Proteins can be assigned to more than one category based on biological process.

Figure 7 is a graph showing sub-classification of regulatory molecules based on molecular function. Regulatory molecules present in the embryonic human CSF, rat CSF, and embryonic mouse brain were further sub-classified based on molecular function. Although in Figure 3 the percentage of regulatory molecules found in CSF and mouse brain appears similar, further sub-classification shows a distinct similarity in protein classes between CSF samples and a distinct difference in protein classes between CSF and brain samples.

Figure 8 is a graph showing sub-classification of protein metabolism and modification based on biological process. Proteins involved in protein metabolism and modification present in the embryonic human CSF, rat CSF, and embryonic mouse brain were further sub-classified based on biological process. Although in figure 4 the percentage of proteins involved in protein metabolism and modification found in CSF and mouse brain appeared similar, further sub-classification clearly shows a distinct similarity in protein classes between CSF samples and a distinct difference in protein classes between CSF and brain samples.

Figures 9A-9Z shows that embryonic CSF supports cortical explant viability and growth and E17 CSF stimulates proliferation of neural progenitor cells in cortical explants and in cell culture. Figure 9A is a schematic diagram of cortical explant dissections; 3-D image of E16 rat brain with dark box depicting region of dissection for explant. Cross section image of rat brain depicts medial and lateral border of explant dissection. Crossed arrows designate orientation of explant (E) on membrane with orienting cut at medial-caudal side (L-lateral, M-medial, C-caudal, R-rostral). Figures 9B-9D are images showing tissue stained with Hoechst (blue), anti-PH3 (red), and anti-Tuj1 (green). (Figure 9B) E17 rat cortex; (Figures 9C and 9D) E16 explants grown for 24 hours in 100% embryonic CSF (e-CSF) and 100% artificial CSF

(ACSF), respectively. Explants grown in 100% embryonic CSF *in vitro* maintain tissue histology similar to embryo *in vivo*. Figures 9E-9G show tissue stained with anti-BrdU (blue), anti-PH3 (red), anti-Tuj1 (green). (Figure 9E) E17 rat cortex labeled with BrdU, mother was administered a bolus of BrdU (60mg/kg) 3 hours prior to removing embryos. (Figures 9F-9G) E16 explant grown for 24 hours in 100% embryonic CSF and ACSF respectively. Explants were administered BrdU (20uM) 30 minutes prior to fixation. Explants grown in 100% embryonic CSF incorporated BrdU after 24 hours *in vitro* indicating cells undergoing DNA synthesis. Survival and proliferation of the explants grown with embryonic CSF are indicated by immunoreactivity for phospho-Histone H3 (PH3, a marker of cell division) along the ventricular surface, BrdU incorporation (marking proliferating cells at the time of BrdU exposure) in the ventricular zone, and Tuj1-positive-staining neurons in the developing cortical plate. Figures 9H-9M show E16 explants cultured in 100% E13 or E17 CSF for 24 hours, (Figures 9H and 9I) stained with anti-PH3 (red) and Hoechst (blue) (Figures 9J and 9K) stained with anti-Vimentin 4A4 (green) and Hoechst (blue), (Figures 9L and 9M) merged images of anti-PH3 (red), anti-Vimentin 4A4 (green) and Hoechst (blue). Figure 9N shows quantification of total PH3-positive-staining cells per explant grown with E13 and E17 CSF. The number of PH3-positive-staining cells is represented as mean \pm SEM. The number of PH3-positive-staining cells was significantly increased in explants cultured with E17 CSF compared to E13 CSF (Mann-Whitney; E17: 44.1 ± 1.43 ; E13: 25 ± 4.2 ; $p < 0.05$; $n = 4$). Figure 9O shows quantification of PH3-positive-staining cells along the ventricle per explant grown with E13 and E17 CSF. The number of PH3-positive-staining cells along the ventricle was significantly increased in explants cultured with E17 CSF compared to E13 CSF (Mann-Whitney; E17: 32.3 ± 0.79 ; E13: 12.8 ± 3.9 ; $p < 0.05$; $n = 4$). Figure 9P shows quantification of Vimentin 4A4-positive-staining cells per explant grown with E13 and E17 CSF. The number of Vimentin 4A4-positive-staining cells was significantly increased in explants cultured with E17 CSF compared to E13

CSF (Mann-Whitney; E17: 45.9 ± 6.6 ; E13: 13.9 ± 2.2 , $p < 0.05$; $n = 3$). Figures 9Q-9Y show single cells from dissociated primary neurospheres grown in: (Figures 9Q, 9T, and 9W) 20% ACSF, (Figures 9R, 9U, and 9X) 20% E14 CSF, (Figures 9S, 9V, and 9Y) 20% E17 CSF for 9 DIV and stained with anti-GLAST, Hoechst, and merged images, respectively. Primary dissociated spheres grown in E17 CSF proliferate and form spheres of slowly dividing GLAST positive cells. Figure 9Z shows quantification of average number of spheres per cm^2 formed in the various conditions at 9 DIV.

Figures 10A-10F show that e-CSF supports cortical explant survival. Figure 10A, 10C, and 10E show E16 explants grown for 24 hours in 100% e-CSF, and Figures 10B, 10D, and 10F show 100% artificial CSF (ACSF) and stained for early apoptotic cell death marker Cleaved Caspase 3 (CC3). Explants grown in 100% embryonic CSF has decreased CC3 stain compared to explants grown in ACSF. The embryonic CSF supports tissue viability and survival.

Figures 11A-11I show neural stem cells grown in embryonic CSF maintain undifferentiated state. Figures 11A-11C show dissociated cells from primary neurospheres cultured in E17 CSF for 10 DIV. Cells maintain GLAST-positive neural progenitors when cultured in embryonic CSF. Figures 11D-11F show dissociated cells from primary neurospheres cultured in E17 CSF for 5 DIV and then supplemented with EGF and FGF. GLAST-positive-staining cells cultured in E17 CSF maintain responsiveness to EGF and FGF suggesting that stem cells cultured in CSF maintain undifferentiated and uncommitted state. Figures 11G-11I show dissociated cells from primary neurospheres cultured in EGF and FGF for 10 DIV.

Figures 12A-12G show embryonic CSF maintains GLAST-positive-staining stem cells for 44 DIV. Figure 12A-12D show dissociated cells from primary neurospheres cultured in E17 CSF for 44 DIV. Cells maintain GLAST-positive neural progenitors when cultured in embryonic CSF for extended periods of time. Figure 12E shows quantification of number of

spheres per cm^2 when cultured for 10 DIV versus 44 DIV. Figure 12F shows quantification of relative colony size of spheres cultured for 10 DIV versus 44 DIV. Figure 12G shows quantification of circularity of spheres cultured for 10 DIV versus 44 DIV.

5 **Figure 13A-13C** show dynamic changes in CSF protein concentration and composition during development. Figure 13A is a graph of total CSF protein concentration collected from rats at various stages in development. Figure 13B is a silver stain of CSF from different ages in development, revealing a dynamic fluid with numerous changes in protein composition over
10 time. Figure 13C is a western blot analysis of specific proteins identified in the embryonic CSF. CSF collected from various ages during development and immunoblotted with antibodies to Albumin, Transferrin, FGF2, EC-SOD, Cathepsin B, Cystatin C, Amyloid Precursor Protein (sAPP).

Figures 14A-14F show that embryonic CSF activates IGF1R and p-
15 AKT signaling and provides a source of insulin signaling to progenitor cells along the ventricle in the cortex. Figure 14A shows Igf2 peptides recognized by LC-MS/MS in E17 CSF (red). Figure 14B shows that Igf2 levels are detectable by western blot at E13 and then decrease into adulthood. Figure 14C shows an in situ hybridization for IGF2 at E14. c' and c'' are magnified images
20 showing IGF2 levels highest in leptomeninges and blood vessels within the cortex, Figure 14D shows an in situ hybridization for IGF2 at E17. d' and d'' are magnified images showing IGF2 levels are highest in the choroid plexus (CP), leptomeninges, and blood vessels within the cortex, Figure 14E 10X and (e') 20X image of IHC analysis of Igf1R localization in the E17 developing rat
25 brain reveals Igf1R localization along the apical surface of the ventricle. Figure 14F shows lysates of cortical cells treated with ACSF, E17 CSF, or IGF2 for 5 minutes immunoblotted with antibodies to p-IGF1R, p-AKT, AKT, P-ERK1/2, and ERK1/2.

Figures 15A-15K show that Igf2 maintains and stimulates proliferation
30 of neural progenitor cells. Figures 15A-15D show single cells dissociated from

primary neurospheres grown in control media or control media plus IGF2 (20 ng/ml). Small secondary spheres cultured with Igf2 alone form after 10 DIV. IHC with anti-GLAST on secondary spheres after 10 DIV shows GLAST immunoreactivity, indicating maintenance of neural progenitor cell identity with IGF2 alone. Figures 15E-15G show E16 cortical explants cultured in control E17 CSF or E17 CSF with IGF2 neutralizing antibody (IGF2 NAb), stained with anti-Vimentin 4A4 (green) and Hoechst (blue). Figure 15G shows quantification of Vimentin 4A4-positive-staining cells per explant grown with E17 control CSF or with IGF2 NAb. The number of Vimentin 4A4-positive-staining cells was significantly decreased in explants cultured with E17 CSF plus IGF2 NAb compared to control E17 CSF (Mann-Whitney; E17 control mean: 28.8 ± 4.3 ; E17 Igf2 neutralizing antibody mean: 13.9 ± 2.0 ; $n = 4$, $p < 0.05$). Figures 15H-15J show E16 cortical explants cultured with Neural Basal Media plus ACSF (control) or with supplemental IGF2 stained with anti-Vimentin 4A4 (green) and Hoechst (blue). Figure 15J shows quantification of Vimentin 4A4-positive-staining cells per explant grown with control media or with supplemental IGF2. The number of Vimentin 4A4-positive-staining cells was increased in explants cultured with IGF2 supplementation compared with control (Mann-Whitney; Igf2 supplementation mean: 36.7 ± 2.1 ; control mean: 20.4 ± 4.46 ; $n = 8$, $p < 0.05$). Figure 15K shows an overall model depicting factors released from the choroid plexus into the CSF can act over large distances to regulation progenitor cell survival, proliferation and maintenance. As an example, we illustrate IGF2 as a secreted factor that regulates the maintenance of progenitor cell fate.

25

Detailed Description

Here we undertake a systematic, detailed, and unbiased proteomic analysis of human e-CSF from Carnegie Stage 19-20 (approximately 48-51 days post ovulation). We also report an extensive proteome analysis of rat e-CSF from three different time points E12.5, E14.5, and E17.5 during cortical

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development and list all the proteins that are common among the three time points as well as those proteins that are different.

We report a list of the common proteins found between the human and rat e-CSF. Furthermore, using various gene ontology programs we categorize the proteins in the e-CSF and compare the subcellular localization, molecular function, and biological process of embryonic human and rat CSF. We find 130 proteins shared between the human and rat e-CSF and that there are many similarities in the categories of proteins found within the CSF based on molecular function and biological process. This systematic analysis of proteins common to many ages lays the groundwork for analysis of changing CSF components that may have more specific developmental roles.

As described herein, rat embryonic CSF proteome is a complex and dynamic milieu of extracellular matrix proteins, intracellular proteins, and signaling factors (see also, Zappaterra et al., J Proteome Res 6, 3537-48 (2007)). However, prior to the present invention, the direct influence of embryonic CSF on cortical progenitor cells had been challenging to assess due to the difficulty of obtaining substantial amounts of CSF. In addition, we developed a cortical explant culture system in which embryonic cortex dissected from a consistent location of the lateral wall is placed on polycarbonate membranes and floated on embryonic CSF (Figure 9A). This explant culturing technique enables variable pairings of cortical tissue and CSF, or e-CSF components to investigate the relationship between cortical progenitor cells and CSF-mediated signaling.

On the basis of this work, the present invention features methods for isolation of e-CSF, and methods of culturing cells (e.g., stem cells or progenitor cells such as neural stem cells) using one or more (e.g., 2, 3, 4, 5, 6, 8, or 10) components (e.g., a purified or recombinantly produced polypeptide) of e-CSF and compositions including cells with one or more such components.

Isolation of CSF from human embryos

In general, CSF can be isolated from any mammalian embryo using the methods described herein. Typically the embryos at the appropriate stage are collected, and the extra embryonic membranes and tissues are dissected away in a buffer solution (e.g., phosphate-buffer saline (PBS) or Hanks' Balanced Salt Solution (HBSS)). A capillary needle (e.g., a syringe or microcapillary pipette) is placed into a CNS ventricle (e.g., lateral, third, or fourth ventricle) and the CSF is withdrawn. To avoid contaminating cells, it is desirable that contact with either blood vessels or with the neuroepithelium be avoided. To ensure that the e-CSF sample is cell-free, the sample can be treated to remove cells (e.g., by centrifugation or by filtration).

In one example, human embryos were collected through the joint MRC-Wellcome Trust Human Developmental Biology Resource at the University of Newcastle, Institute of Human Genetics. The embryos at CS 19-20 were placed in ice-cold sterile Phosphate Buffered Saline (PBS) solution and all extra-embryonic membranes and tissues were removed. The embryos were washed in sterile PBS and carefully placed on the dissection platform under the microscope. A Hamilton syringe was placed carefully into the fourth ventricle and the CSF was collected paying close attention not to make contact with the neuroepithelium lining of the fourth ventricle. The samples used for analysis had no microscopically visible contaminating neuroepithelial cells or red blood cells. Nonetheless, the CSF samples were centrifuged at 10,000 g at 4 °C for 10 minutes to remove any intact contaminating cells and then were frozen at -80°C until further analysis.

In another example, rat embryos (Sprague Dawley) at stage E12.5, E14.5 and E17.5 were removed from extra-embryonic membranes and tissues and placed in sterile Hanks Balanced Salt Solution (HBSS). Each embryo was handled individually and washed in HBSS, gently patted dry and placed on a microdissection tray. The CSF was carefully aspirated from each rat embryo under the microscope with a pulled tip glass microcapillary pipette (Drummond

Scientific Company 20 µl). The needle was steadily held within the inside of the ventricle so as to prevent major contact with the neuroepithelial wall and the CSF was slowly aspirated. For E17.5, the embryo was placed on its back and the glass needle was inserted into the left lateral ventricle and then into the right lateral ventricle to collect the maximum amount of CSF from the lateral ventricles. For E12.5, the embryo was placed on its side and the glass needle was inserted directly into the lateral ventricle. Due to the patency of the neural tube at this stage, the CSF was collected from the developing lateral, third, and fourth ventricle. For E14.5, the embryo was also placed on its side and the glass needle was either inserted into the lateral ventricle or into the fourth ventricle and the CSF was collected from each location separately. Figure 1A is a diagram depicting CSF isolation from E14.5 rat. CSF for each analysis was collected from two entire litters and pooled as one sample. To minimize protein degradation, CSF samples were kept at 4 °C during collection. CSF samples were centrifuged at 10,000g at 4 °C for 10 minutes to remove any contaminating cells. The samples that we used for analysis had no visible sign of contaminating neuroepithelium cells or red blood cells as we could detect under the microscope. Samples were frozen at -80°C until further analysis.

20 Cell culture using e-CSF components

As we have shown that e-CSF stimulates proliferation and maintenance of neural stem cells in vitro and have, for the first time, identified many of the polypeptides found in e-CSF, it now becomes possible to use these identified proteins in a cell culture system as proliferation, differentiation and maintenance, particularly with regard to stem cells and progenitors, especially those of neural origin. On this basis, the invention features methods of cell culture using e-CSF or one or more e-CSF components (e.g., polypeptides, either alone or as a supplement to standard cell culture media, and cell culture compositions including one or more components of e-CSF.

Any of the polypeptides identified in e-CSF may be used as a supplement in a cell culture (e.g., those described in Tables 1-4), or a combination of components from e-CSF (e.g., polypeptides) may be used for cell culture (e.g., for proliferating cells such as stem cells). Functional fragments (e.g., soluble fragments) of any of the proteins described herein) may be used in the invention. Soluble fragments are particularly useful for membrane bound proteins.

Cell types

The compositions and methods of the invention may employ any type of cultured cell known in the art. In particular embodiments, a proliferating cell, such as a stem cell or progenitor cell is used. Neural cells (e.g., neural stem cells and neural progenitor cells) can be used in the invention as well. Human and non-human mammal cells (e.g., rat or mouse) cells are used in certain embodiments. Stem cell lines are, for example, commercially available or can be obtained directly from laboratory animals such as mice or rats.

Cell media compositions

In one embodiment, the cell media composition of the invention includes any medium known in the art supplemented with at least one (e.g., at least 2, 3, 4, 5, 6, 8, 10, 15, 25, 50) components identified in e-CSF (e.g., those described herein). Exemplary media types used for culturing neural stem cells include Neuralbasal Media (Invitrogen Corp.), Neural Stem Cell Commitment Media or Neural Stem Cell Growth Media (AlphaGenix, Inc.), and NeuroCult NS-A Proliferation, Human, Kit or NeuroCult NS-A Differentiation Human Kit (Stem Cell Technologies, Inc.). In another embodiment, the cell culture media is derived entirely from e-CSF components.

Determining whether a component of e-CSF enhances proliferation, maintenance, or differentiation of a cell

Any component of e-CSF (e.g., those described herein) may be analyzed to determine its effect on a cell (e.g., a neuronal progenitor or stem cell described herein) in culture. Desirable components are those which result in maintenance of the cells or those that result in more rapid proliferation or differentiation of the cell. Assays to measure proliferation (e.g., using cell dyes or incorporation of a modified nucleotide such as BrdU) and differentiation (e.g., using differentiation markers known in the art) are well known by those of skill in the art.

The role of e-CSF in brain development

Embryonic CSF plays a fundamental, dynamic role in defining an endogenous niche for the survival and proliferation of cortical neural progenitors. CSF alone supports the growth and proliferation of cortical explants in the absence of exogenous media or factors. CSF from different ages in development harbors distinct proliferative capacities for neural progenitor cells the characterization of the CSF proteome has identified several classes of proteins in the CSF established as essential regulators of proliferation and maintenance of neuronal progenitor cells; and we identified and characterized a novel role for IGF2 signaling in the embryonic CSF as a regulator of cortical progenitor cell proliferation.

The CSF has been traditionally considered as a fluid cushion that bathes the central nervous system, acting as a passive sink for biomarkers of central nervous system function and pathology. Collectively, our study represents a paradigm shift in developmental neuroscience, suggesting that the the embryonic CSF proteome as a dynamic milieu of growth-promoting signals for neural stem cells (Figure 15K).

The CSF-choroid-plexus system is ideally suited to act as a rapid, spatially synchronized medium for triggering local and global changes in

molecular signaling. Dynamism of factors such as IGF2 levels in the CSF is consistent with a role of the CSF as a vehicle for orchestrating cortical neurogenesis: IGF2 expression increases during development, is maximal during the peak of cortical neurogenesis in the rat brain (E17-E19), and declines as cortical neurogenesis nears completion around birth. Therefore, the appearance of signaling factors such as IGF2 stimulate the proliferation of cortical progenitors to maintain them in an uncommitted state through development. Igf2 and other molecules (Martin et al., Dev Biol 297, 402-16 (2006)) appear to be released in the CSF by choroid plexus, which appears in the lateral ventricles between E13 and E15. These signaling molecules, via the CSF must act widely on cortical precursors that, in the case of the embryonic human brain, may be centimeters away from the source of the factor. It is unclear whether there is a gradient of Igf2 in the embryonic CSF influences regional differences in proliferation across the cortical mantle (Bayer et al., Prog Neurobiol 29, 57-106 (1987)), as has been shown for Slit in the adult CSF (Sawamoto et al., Science 311, 629-32 (2006)), or whether ciliary movement or diffusion through a far smaller volume equilibrates Igf2 concentration in the embryonic ventricles. A fundamental aspect of neural differentiation may be the simple isolation of developing cells from this growth-promoting environment, by the withdrawal of the ventricular process (Cappello et al., Nat Neurosci 9, 1099-107 (2006)).

Our findings have several important implications. First, CSF in the embryo and the adult is a dynamic fluid that contacts a number of CNS precursors as well as differentiating neurons and glia. Second, CSF components can be dispersed over large areas and thus may be more significant and pervasive regulators of development, stem cell renewal, disease, neurodegeneration and behavior than previously thought. Third, since the CNS represents just one example of an epithelium that grows in relation to an extracellular fluid, our findings may generalize to other epithelia which are likely to develop using similar rules, with a major contributor to the “stem cell

niche” being the fluid that bathes the epithelium (Bendall et al., Nature 448, 1015-21 (2007)), similar to the microenvironment that invests hematopoietic stem cells, of which Igf2 is also an essential component (Zhang et al., Blood 103, 2513-21 (2004); Orkin et al., Cell 132, 631-44 (2008)), as in the embryonic CSF. Finally, if a major component of the stem cell niche reflects secreted factors acting at large distances from their sources, a deeper understanding of the proteomic composition of extracellular fluids may provide unexpected ways to regulate stem cell behavior.

10 **In-gel digestion and mass spectrometry**

To determine the protein contents of e-CSF, frozen CSF samples were thawed on ice. Sample buffer was added and the samples were boiled for 5 minutes and subjected to SDS-PAGE using either 10% or 7.5% polyacrylamide (37.5:1 acrylamide:bis-acrylamide) gels as indicated in Figure 1B-1C. Each gel lane (which included the 4.2% polyacrylamide stacking gel) was cut into ten regions and each region was diced and subjected to in-gel digestion with sequencing grade modified trypsin (Promega, 6 ng/μl) in 50mM ammonium bicarbonate overnight at 37 °C. Peptides were extracted with 50% acetonitrile (MeCN), 2.5% formic acid (FA) and then dried. Peptides were then resuspended in 2.5% MeCN, 2.5% FA and loaded using an autosampler onto a microcapillary column packed with 12cm of reverse phase MagicC18 material (5 μm, 200Å, Michrom Bioresources, Inc.). Elution was performed with a 5-35% MeCN (0.1 % FA) gradient over 60 minutes, after a 15 minute isocratic loading at 2.5% MeCN, 0.5% FA. Mass spectra were acquired in LTQ and LTQ-XL linear ion trap mass spectrometers (Termo Electron) over the entire 75 minutes using ten MS/MS scans following each survey scan. Raw data were searched against either the human or rat IPI forward and reverse concatenated databases using Sequest software requiring tryptic peptide matches with a 2 Da mass tolerance (Elias et al., Nat Methods, 2005. 2:667-75). Cysteine residues were required to have a static increase in 71.0 Da for acrylamide adduction and

differential modification of 16.0 Da on methionine residues was permitted. The resultant top matches for all analyses of each gel lane were compiled. Each list was then filtered independently using a dCn2 score of 0.2 and Xcorr scores of 1.8, 2.0 and 2.5 for singly, doubly, and tripled charged ions respectively.

5 Proteins on these filtered lists that had two or more peptides were retained. However keratin proteins were removed as they are known contaminants in most gel-based proteomic analyses. Based on the number of reverse database false-positives that were also retained following these filtering criteria, we estimate the following false-positive rates for the proteins in each sample: rat
10 E12.5 lateral ventricle (LV), 0.45%; rat E14.5LV, 0.30%; rat E17.5LV, 0.50%; rat E14.5 4th ventricle, <0.00%; and human CS 20, <0.00%. For the human CS 19 sample the estimated false-positive rate for proteins identified by more than three peptides is <0.00%. The dataset of proteins for the embryonic mouse brain was extracted from LC-MS/MS data collected from 16 strong cation
15 exchange (SCX) fractions generated during our previous study of the forebrain and midbrain extracts of E16.5 mouse embryos (Ballif et al., Mol Cell Proteomics, 2004. 3:1093-101). We compiled the LC-MS/MS data from four SCX fractions in the middle of the SCX gradient (not enriched for phosphopeptides) from each of the four regions of the gel and the top 200
20 identified proteins were subjected to further analysis.

Analysis of the human embryonic proteome

Human CSF was collected from the fourth ventricle, as mentioned above, from two independent embryos at Carnegie Stage (CS) 19-20. From the
25 first embryo (CS19) a total of 15 µl was collected, and from the second embryo (CS20) a total of 70 µl was collected. The CSF from these two independent samples was separated by 1-D SDS-PAGE; Figure 1B shows the Coomassie stained protein pattern of the CSF from CS20 and CS19 embryos run on 7.5% and 10% polyacrylamide gels, respectively. The two human e-CSF samples
30 were analyzed separately. Table 1 shows the proteomic analysis of the CSF

collected from the CS20 embryo and lists 188 proteins with 2 or more peptides identified. Using a number of protein analysis programs such as UniProt, Gene Ontology™ (GO), and the PANTHER (Protein Analysis Through Evolutionary Relationships) classification system we categorized the proteins found from the mass spectrometry data and list subcellular localization, protein function, tissue specificity, and relevant notes pertaining to each protein (Table 1) (Ballif et al., Mol Cell Proteomics, 2004. 3:1093-101). Analysis of the CSF from the CS19 human sample revealed 772 proteins with more than three peptides identified. The search results from this analysis suggested the presence of a number of non-CSF contaminants including 7 different mitochondrial specific precursor proteins such as the mitochondrial precursors for 4-aminobutyrate aminotransferase, fumarate hydratase, and isoform dut-M of deoxyuridine 5'-triphosphate nucleotidohydrolase, whereas no mitochondrial precursor proteins were identified in the rat CSF or in the CS20 human CSF sample. Therefore, the CS19 list was not further considered in the comparison to rat CSF. However, the proteins from this analysis are presented in Table 2 as this list is certainly enriched for human e-CSF proteins. The substantial differences between this sample and the other human and rat samples suggest that this sample contained multiple impurities, likely from lysed blood and/or neuroepithelial cells. Nonetheless, the differences highlight that the MS analysis is highly sensitive to contaminants, and that the absence of mitochondrial proteins in other samples indicates that they are probably quite pure.

Table 1. Protein list of mass spectrometry analysis of Carnegie Stage 20 embryonic human CSF.

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
206	584	P04114	APOLIPOPROTEIN B-100 PRECURSOR	515563	Secreted	Lipid and fatty acid transport and metabolism	Plasma	Apo B-100 functions as a recognition signal for the cellular binding and internalization of LDL particles by the apoB/E receptor	Yes - all rat samples
43	79	P02751	ISOFORM 1 OF FIBRONECTIN PRECURSOR	262607	Secreted, extracellular space, extracellular matrix	Cell adhesion, cell motility, wound healing, and maintenance of cell shape	Plasma fibronectin made by liver and cellular fibronectin made by fibroblasts, epithelial and other cell types is deposited in the extracellular matrix	Integrin signaling pathway	Yes - all rat samples
42	114	P01023	ALPHA-2-MACROGLOBULIN PRECURSOR	163278	Secreted	Serine Protease Inhibitor	Plasma	Contrary to the rat protein, which is an acute phase protein, this protein is always present at high levels in circulation	Yes - all rat samples
27	63	P02787	SEROTRANSFERRIN PRECURSOR	77050	Secreted	Transport, Transfer/Carrier	Plasma	Transport of iron from sites of absorption and heme degradation to those of storage and utilization. Serum transferrin may also play a role in stimulating cell proliferation	Yes - all rat samples
25	91	Q5D0D7	ALB (Albumin) PROTEIN	71705	Secreted	Transport, Transfer/Carrier	Plasma	Serum albumin, the main plasma protein, has a good binding capacity for water, calcium, sodium, potassium, fatty acids, hormones, bilirubin and drugs. Its main function is the regulation of the colloidal osmotic pressure of blood	Yes - all rat samples
23	34	P01024	COMPLEMENT COMPONENT 3 PRECURSOR	187306	Secreted	Complement mediated immunity	Plasma	Plays a central role in the activation of the complement system	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
21	87	P02771	ALPHA-FETOPROTEIN PRECURSOR	68678	Secreted	Transport, Transfer/Carrier	Plasma	Binds copper, nickel, and fatty acids as well as, and bilirubin less well than, serum albumin	Yes - all rat samples
19	45	P19823	INTER-ALPHA-TRYPSIN INHIBITOR HEAVY CHAIN H2 PRECURSOR	106436	Secreted	Serine Protease Inhibitor	Plasma, widely distributed	May act as a carrier of hyaluronan in serum or as a binding protein between hyaluronan and other matrix protein, including those on cell surfaces in tissues to regulate the localization, synthesis and degradation of hyaluronan which are essential to cells undergoing biological processes.	Yes - present in rat E14.5, E17.5LV
14	14	P49327	FATTY ACID SYNTHASE	273400	Cytoplasm	Lipid and fatty acid biosynthesis	Ubiquitous. Prominent expression in brain, lung, and liver	Involved in catalyzing the formation of long chain fatty acids	Yes - all rat samples
14	15	P24821	ISOFORM 1 OF TENASCIN PRECURSOR	240866	Secreted, extracellular space, extracellular matrix	Cell adhesion, extracellular matrix glycoprotein-mediated signaling	Widely distributed	Extracellular matrix protein implicated in guidance of migrating neurons as well as axons during development, synaptic plasticity as well as neuronal regeneration. Ligand for integrin receptors.	Yes - all rat samples
13	25	P19827	INTER-ALPHA-TRYPSIN INHIBITOR HEAVY CHAIN H1 PRECURSOR	101389	Secreted	Protease Inhibitor	Plasma	See notes on INTER-ALPHA-TRYPSIN INHIBITOR HEAVY CHAIN H2 PRECURSOR above.	Similar to inter-alpha-inhibitor H4 heavy chain
12	17	P01031	COMPLEMENT C5 PRECURSOR	188331	Secreted	Complement mediated immunity	Plasma	Activation of C5 by a C5 convertase initiates the spontaneous assembly of the late complement components, C5-C9, into the membrane attack complex.	Yes - present in E17.5LV

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
12	19	P02671	ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR	94973	Secreted	Blood clotting	Plasma	Monomers polymerize into fibrin and also acts as a cofactor in platelet aggregation.	Yes - all rat samples
11	27	P02679	ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR	51512	Secreted	Blood clotting	Plasma	Monomers polymerize into fibrin and also acts as a cofactor in platelet aggregation.	Yes - all rat samples
11	12	P12111	ALPHA 3 TYPE VI COLLAGEN ISOFORM 1 PRECURSOR	343669	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Widely distributed, expressed in muscles	Collagen VI acts as a cell-binding protein	Yes - present in rat E14.5, E17.5LV
10	19	P02647	APOLIPOPROTEIN A-I PRECURSOR	30778	Secreted	Lipid and fatty acid transport and metabolism	Major protein of plasma HDL, also found in chylomicrons.	Participates in the reverse transport of cholesterol from tissues to the liver for excretion by promoting cholesterol efflux from tissues.	Yes - all rat samples
10	13	P06396	ISOFORM 1 OF GELSOLIN PRECURSOR	85698	Secreted	Actin remodeling - Cell structure	Plasma	Calcium-regulated, actin-modulating protein. It can promote the assembly of monomers into filaments as well as sever filaments already formed. May be involved in myelination.	Yes - all rat samples
10	16	P05155	PLASMA PROTEASE C1 INHIBITOR PRECURSOR	55154	Secreted	Serine Protease Inhibitor	Plasma	May regulate complement activation, blood coagulation, fibrinolysis and the generation of kinins.	Yes - all rat samples
10	12	P0C0L4	COMPLEMENT C4-A PRECURSOR	192771	Secreted	Complement mediated immunity	Plasma	Inflammatory response	Yes - all rat samples
10	10	Q13822	ISOFORM 1 OF ECTONUCLEOTIDE PYROPHOSPHATASE/PHOSPHODIESTERASE 2	99004	Membrane	Hydrolase	Predominantly expressed in brain, placenta, ovary, and small intestine.	Localized in secretory epithelial cells in the brain and the eye including choroid plexus epithelial cells, ciliary epithelial cells, iris pigment epithelial cells, and retinal pigment cells. Has a potent tumor cell motility-stimulating activity.	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
9	16	P02675	FIBRINOGEN BETA CHAIN PRECURSOR	55928	Secreted	Blood clotting	Plasma	Monomers polymerize into fibrin and also acts as a cofactor in platelet aggregation.	Yes - all rat samples
9	22	P02766	TRANSTHYRETIN PRECURSOR	15887	Secreted	Hormone transport	Most abundant in the choroid plexus. Also present in the liver	Thyroid hormone-binding protein. Probably transports thyroxine from the bloodstream to the brain.	Yes - all rat samples
8	17	P01009	ALPHA-1-ANTITRYPSIN PRECURSOR	46737	Secreted	Serine Protease Inhibitor	Plasma	Belongs to the serpin family	Yes - all rat samples
8	21	P02760	AMBP PROTEIN PRECURSOR	38999	Secreted	Serine Protease Inhibitor	Plasma, urine, and cerebrospinal fluid	It appears not only as a free monomer but also in complexes with IgA and albumin.	Yes - all rat samples
8	11	P23471	ISOFORM SHORT OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA PRECURSOR	163444	Membrane	Cell surface receptor mediated signal transduction, transmembrane receptor protein tyrosine phosphatase activity	Central nervous system	May be involved in the regulation of specific developmental processes in the CNS	Yes - all rat samples
8	8	P08238	HYPOTHETICAL PROTEIN DKFZP761K0511 - heat shock 90KDa protein 1, beta	84843	Cytoplasm	Chaperone, protein folding, stress response	Ubiquitous	Belongs to the heat shock protein 90 family	Yes - all rat samples
8	15	Q9P173	PRO2275 - Serpin peptidase inhibitor, clade A (alpha-1 antiproteinase, antitrypsin), member 1	13097	Secreted	Serine Protease Inhibitor - Blood coagulation	Plasma	Belongs to the serpin family	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
7	9	P00450	CERULOPLASMIN PRECURSOR	122205	Secreted	Transport, Transfer/Carrier, Oxidoreductase	Plasma	It is involved in iron transport across the cell membrane, and metal ion oxidoreductase activity	Yes - similar to GPI anchored ceruloplasmin present in all rat samples
7	8	N/A	45 KDA PROTEIN - Homologous to Phospholipid transfer protein	44847	Secreted	Transport, Transfer Carries	Plasma, widely distributed	Involved in phospholipid transfer in the serum.	Yes - all rat samples
7	10	P19022	CADHERIN-2 PRECURSOR (Neuronal cadherin)	99851	Membrane	Cell adhesion	Widely distributed	May be involved in neuronal tissue recognition	Yes - neural cadherin precursor present in all rat samples
7	7	P76527	ISOFORM 1 OF DNA-DEPENDENT PROTEIN KINASE CATALYTIC SUBUNIT	469089	Nucleus	Serine/threonine-protein kinase	Ubiquitous	Molecular sensor for DNA damage	
7	7	Q5CAQ7	HEAT SHOCK PROTEIN HSP 90-ALPHA 2	98113	Cytoplasm	Molecular chaperone, protein folding, stress response	Ubiquitous	Belongs to the heat shock protein 90 family	Yes - HSP 90 family present in all rat samples
7	7	P35580	MYOSIN-10	228939	Intracellular	Cell structure, cell motility	Brain	Actin binding motor protein	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
7	16	P20742	PREGNANCY ZONE PROTEIN PRECURSOR	163836	Secreted	Protease Inhibitor	Plasma	Belongs to the protease inhibitor I39 (alpha-2-macroglobulin) family	Yes - alpha-1-macroglobulin present in all rat samples
6	10	P02649	APOLIPOPROTEIN E PRECURSOR	36154	Secreted	Lipid and fatty acid transport and metabolism	Plasma	Mediates the binding, internalization, and catabolism of lipoprotein particles.	Yes - all rat samples
6	6	P46821	MICROTUBULE-ASSOCIATED PROTEIN 1B	270620	Intracellular	Cell structure	Brain	The function of brain MAPS is unknown. Phosphorylated MAP1B may play a role in the cytoskeletal changes that accompany neurite extension.	Yes - present in rat E12.5LV, E17.5LV
6	6	P06681	COMPLEMENT C2 PRECURSOR (FRAGMENT)	83268	Secreted	Serine protease, complement-mediated immunity	Plasma	Belongs to the peptidase S1 family.	Yes - all rat samples
6	6	P11047	LAMININ GAMMA-1 CHAIN PRECURSOR (Laminin B2 chain)	177607	Secreted, extracellular space, extracellular matrix	Extracellular matrix linker protein-mediated signaling	Basement membranes	Binds to cells and is thought to mediate the attachment, migration and organization of cells into tissues during embryonic development by interacting with other extracellular matrix components.	Yes - present in rat E12.5LV, E14.5
6	7	P01019	ANGIOTENSINOGEN PRECURSOR	53154	Secreted	Serine Protease Inhibitor	Plasma	Belongs to the serpin family. Helps regulate volume and mineral balance of body fluids.	Yes - all rat samples
6	7	P33151	CADHERIN-5 PRECURSOR	87516	Membrane	Cell adhesion	Endothelial tissues and brain	Plays a role in endothelial adhesion.	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
6	7	P98160	BASEMENT MEMBRANE-SPECIFIC HEPARAN SULFATE PROTEOGLYCAN CORE PROTEIN PRECURSOR (Perlecan)	468825	Secreted, extracellular space, extracellular matrix	Cell adhesion	Widely distributed in various tissues	Integral component of basement membranes.	Yes - all rat samples
6	10	O00468	AGRIN PRECURSOR	214889	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Embryonic nervous system and muscle.	Component of the basal lamina that binds to laminin.	Yes - all rat samples
5	7	Q08380	GALECTIN-3-BINDING PROTEIN PRECURSOR	65331	Secreted, extracellular space, extracellular matrix	Integrin-mediated cell adhesion	Ubiquitous. Detected in body fluids such as semen, milk, serum, tears, saliva and urine.	May stimulate host defense against viruses and tumor cells.	
5	5	Q14624	ISOFORM 2 OF INTER-ALPHA-TRYPSIN INHIBITOR HEAVY CHAIN H4 PRECURSOR	101242	Secreted	Protease Inhibitor	Plasma	May be involved in acute phase reactions.	Yes - all rat samples
5	5	P35579	MYOSIN-9	226401	Intracellular	Cytokinesis, cell shape, and specialized functions such as secretion and capping	In the kidney, expressed in the glomeruli. Also expressed in leukocytes.	Non-muscle myosin involved in a number of cellular functions.	Yes - present in 12.5LV, E14.5LV, E17.5LV
5	7	P04217	ALPHA-1B-GLYCOPROTEIN PRECURSOR	54273	Secreted	Function unknown	Plasma	Immunoglobulin domain glycoprotein	Yes - present in E12.5LV, E14.5
5	5	P13611	ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR	372820	Secreted, extracellular space, extracellular matrix	Extracellular matrix protein-mediated signaling, cell adhesion, cell motility	Brain	Also known as chondroitin sulfate proteoglycan core protein 2	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
5	7	P23142	ISOFORM B OF FIBULIN-1 PRECURSOR	77186	Secreted, extracellular space, extracellular matrix	Cell adhesion, cell motility	Widely expressed during embryonic development.	Incorporated into fibronectin-containing matrix fibers. May play a role in cell adhesion and migration along protein fibers within the extracellular matrix. Could play a significant role in modulating the neurotrophic activities of APP, particularly soluble APP.	Yes - all rat samples
5	7	P36955	PIGMENT EPITHELIUM-DERIVED FACTOR PRECURSOR (PEDF)	46342	Secreted	Serpin family member - neurotrophic properties, angiogenic	Retinal pigment epithelial cells, adult murine SVZ cells, and blood plasma	Pigment epithelium-derived factor, a neurotrophic protein, is a member serpin that has been shown to promote the survival and/or differentiation of rat cerebellar granule neurons and human retinoblastoma cells in vitro. Also PEDF was shown to prevent the death and atrophy of spinal motor neurons in the developing neonatal mouse after axotomy. PEDF is also secreted by retinal pigment epithelial cells into the interphotoreceptor matrix, where it acts on photoreceptor cells.	
5	6	P55287	ISOFORM 2 OF CADHERIN-11 PRECURSOR	76541	Membrane	Cell adhesion	Expressed mainly in brain but also found in other tissues. Expressed in neuroblasts	Also known as osteoblast-cadherin	Yes - all rat samples
5	5	P02008	HEMOGLOBIN SUBUNIT ZETA	15506	Intracellular	Oxygen Transport, Transfer - Carrier Protein	Red blood cells	The zeta chain is an alpha-type chain of mammalian embryonic hemoglobin, synthesized primarily in the yolk sac.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
5	5	O00533	ISOFORM 2 OF NEURAL CELL ADHESION MOLECULE L1-LIKE PROTEIN PRECURSOR	136654	Membrane	Extracellular matrix protein-mediated signaling, cell adhesion, cell motility	Expressed in the fetal and adult brain	Plays a role in nervous system development. Plays important roles in neurite outgrowth and neuronal survival.	
5	6	P48681	NESTIN	176706	Intracellular	Cell structure	CNS stem cells.	Upon terminal neural differentiation, nestin is down-regulated and replaced by neurofilaments.	Yes - present in E12.5LV, E14.5LV, E17.5LV
5	7	P00751	ISOFORM 1 OF COMPLEMENT FACTOR B PRECURSOR (FRAGMENT)	85533	Secreted	Serine Protease - Complement Mediated Immunity	Plasma	Hydrolase, Peptidase	Yes - all rat samples
4	5	Q00839	ISOFORM SHORT OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN U	88814	Nucleus, Cell surface	DNA and RNA binding and RNA processing.	Ubiquitous	Involved in RNA splicing	Yes - all rat samples
4	4	P12277	CREATINE KINASE B-TYPE	42644	Membrane	Kinase, energy modulation	Ubiquitous	Plays a central role in tissues with variable energy demands.	Yes - all rat samples
4	4	P34932	HEAT SHOCK 70 KDA PROTEIN 4	94300	Intracellular - Cytoplasm	Heat shock, protein folding, stress response	Ubiquitous	Heat shock protein 70 family	Yes - all rat samples
4	4	P13010	ATP-DEPENDENT DNA HELICASE 2 SUBUNIT 2	82573	Nucleus	Single stranded ATP-dependent DNA helicase activity	Ubiquitous	Plays a role in chromosome translocation. Involved in DNA nonhomologous end joining required for double-strand break repair and V(D)J recombination.	
4	4	Q9BQ02	NCL (Nucleolin) PROTEIN	51641	Nucleus	Major nucleolar protein of growing eukaryotic cells. Nucleotide binding	Ubiquitous	It is thought to play a role in pre-rRNA transcription and ribosome assembly	Yes - present in E12.5LV, E17.5LV

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
4	4	P49321	ISOFORM 1 OF NUCLEAR AUTOANTIGENIC SPERM PROTEIN	85238	Intracellular - Nucleus, Cytoplasm	Nuclear-cytoplasmic shuttling	Testis and Sperm	Required for DNA replication, normal cell cycle progression and cell proliferation.	Yes - all rat samples
4	10	P07477	TRYPSIN PRECURSOR (EC 3.4.21.4)>PIR1:TRPGTR trypsin (EC 3.4.21.4)	26558	Secreted, extracellular space, extracellular matrix	Serine protease	Ubiquitous	Belongs to the peptidase S1 family	
4	7	Q7KZ97	ANTITHROMBIN III VARIANT	52692	Secreted	Serine Protease Inhibitor	Plasma	Regulates the blood coagulation cascade. Belongs to the serpin family	
4	9	P04004	VITRONECTIN PRECURSOR	54306	Secreted, extracellular space, extracellular matrix	Cell adhesion	Plasma	Vitronectin is an abundant glycoprotein found in blood plasma and the extracellular matrix. It regulates proteolysis initiated by plasminogen activation. It is recognized by certain members of the integrin family and serves as a cell-to-substrate adhesion molecule.	
4	4	Q99435	PROTEIN KINASE C-BINDING PROTEIN NELL2 PRECURSOR	91346	Secreted	Cell communication, Cell adhesion, Cell structure	Widely distributed	Regulation of growth and neurogenesis	Yes - all rat samples
4	4	P43146	NETRIN RECEPTOR DCC PRECURSOR	158457	Membrane	Ligand mediated signaling, cell adhesion	Axons of the central and peripheral nervous system and in differentiated cell types of the intestine	Axon guidance and neuronal growth cone growth	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
4	4	Q02246	CONTACTIN-2 PRECURSOR	113393	Membrane; (attached to the neuronal membrane by a GPI-anchor and is also released from neurons)	Cell Adhesion - Neurogenesis	Highly expressed in brain	May play a role in the initial growth and guidance of axons. Belongs to the immunoglobulin superfamily.	Yes - all rat samples
4	5	O75882	ISOFORM 1 OF ATTRACTIN PRECURSOR	158537	Membrane	Protease involved in cell clustering during inflammatory response	Secreted by activated T lymphocytes. Also expressed in peripheral blood leukocytes, spleen, lymph node, tonsil, bone marrow and fetal liver.	May regulate chemotactic activity of chemokines. Has a critical role in normal myelination in the central nervous system.	Yes - all rat samples
4	6	Q96PQ8	FACTOR VII ACTIVE SITE MUTANT IMMUNOCONJUGATE	75553	Secreted	Serine Protease - Blood clotting	Plasma	Involved in blood coagulation, activated by Factor Xa	
4	5	O00391	QUIESCIN Q6 ISOFORM A	82578	Membrane	Oxidase	Widely distributed, expressed in heart, placenta, lung, liver, skeletal muscle, pancreas and very weakly in brain and kidney	May contribute to disulfide bond formation in a variety of secreted proteins. Induced in quiescent cells.	Yes - all rat samples
4	7	P02461	COLLAGEN ALPHA-1(III) CHAIN PRECURSOR	138555	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Widely distributed, highly expressed in skin, lungs, intestinal walls, and blood vessels	Present in most soft connective tissue	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
4	6	Q4KKU6	DESMOGLEIN 2	122294	Membrane	Cell adhesion	Widely distributed	Component of desmosomes	
4	4	Q92945	FAR UPSTREAM ELEMENT-BINDING PROTEIN 2	72709	Intracellular - Nucleus, Cytoplasm	RNA binding, RNA processing and may play a role in mRNA trafficking	Detected in neural and non-neural cell lines.		Yes - present in E12.5LV, E14.5LV, E17.5LV
4	7	P05546	HEPARIN COFACTOR 2 PRECURSOR	60178	Secreted	Thrombin inhibitor involved in blood clotting - Serine Protease Inhibitor	Expressed predominantly in liver.	Belongs to the serpin family.	Yes - present in E14.5 4thV, E17.5LV
4	4	Q5HY53	FILAMIN A, ALPHA	280018	Intracellular	Cell structure, cell motility	Ubiquitous	Actin binding protein	Yes - all rat samples
4	4	Q86VP6	ISOFORM 1 OF CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1	136376	Nucleus	Transcriptional Enhancer	Widely distributed, highly expressed in lung fibroblasts	Down-regulates ubiquitination of target proteins.	Yes - all rat samples
4	5	Q92859	ISOFORM 1 OF NEOGENIN PRECURSOR	159959	Membrane	Cell adhesion	Widely expressed	May be involved as a regulatory protein in the transition of undifferentiated proliferating cells to their differentiated state. Belongs to the immunoglobulin superfamily.	Yes - all rat samples
4	4	P00747	PLASMINOGEN PRECURSOR	90569	Secreted	Protease	Present in plasma and many other extracellular fluids	Plasmin dissolves the fibrin of blood clots and acts as a proteolytic factor in a variety of other processes including embryonic development, tissue remodeling, tumor invasion, and inflammation.	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	8	P02753	PLASMA RETINOL-BINDING PROTEIN PRECURSOR	23010	Secreted	Vitamin/Co-factor transport	Plasma	Delivers retinol from the liver stores to the peripheral tissues. In plasma, the RBP-retinol complex interacts with transthyretin, this prevents its loss by filtration through the kidney glomeruli.	Yes - all rat samples
3	4	P06727	APOLIPOPROTEIN A-IV PRECURSOR	45399	Secreted	Lipid and fatty acid transport and metabolism	Plasma	May have a role in chylomicrons and VLDL secretion and catabolism. ApoA-IV is a major component of HDL and chylomicrons.	Yes - all rat samples
3	3	O14980	EXPORTIN-1	123386	Intracellular - Nucleus, Cytoplasm	Nuclear export of cellular proteins and RNAs	Ubiquitous	Mediates nuclear export signal dependent protein transport	Yes - present in E12.5LV, E14.5LV, E17.5LV
3	3	P20908	COLLAGEN ALPHA-1(V) CHAIN PRECURSOR	183560	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Ubiquitous	Component of connective tissue	Yes - all rat samples
3	3	P07942	LAMININ BETA-1 CHAIN PRECURSOR	198066	Secreted, extracellular space, extracellular matrix	Extracellular matrix linker protein-mediated signaling	Widely distributed in basement membranes	Is thought to mediate the attachment, migration and organization of cells into tissues during embryonic development by interacting with other extracellular matrix components.	Yes - all rat samples
3	3	Q14974	IMPORTIN BETA-1 SUBUNIT	97170	Intracellular - Nucleus, Cytoplasm	Nuclear protein import	Ubiquitous	Import of proteins with nuclear localization signal	Yes - present in E12.5LV, E14.5LV, E17.5LV

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	3	P23528	COFILIN-1	18371	Intracellular - Nucleus, Cytoplasm	Cell structure - cytoskeleton	Widely distributed in various tissues	Controls actin polymerization and depolymerization. A major component of intranuclear and cytoplasmic actin rods.	Yes - present in E12.5LV, E14.5LV, E17.5LV
3	3	P29966	MYRISTOYLATED ALANINE-RICH C-KINASE SUBSTRATE	31423	Intracellular	Actin binding, actin cytoskeleton, cell structure	Ubiquitous	MARCKS is the most prominent cellular substrate for protein kinase C. MARCKS is a filamentous (F) actin cross-linking protein.	
3	3	Q5JRR8	UBIQUITIN-ACTIVATING ENZYME E1	117849	Intracellular	Protein modification	Ubiquitous	Involved with ubiquitin conjugation by activating ubiquitin	Yes - all rat samples
3	3	P09874	POLY [ADP-RIBOSE] POLYMERASE 1	112953	Nucleus	DNA repair	Ubiquitous	Involved in the base excision repair pathway	Yes - present in E12.5LV, E17.5LV
3	3	P55072	TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE	89191	Intracellular - Nucleus, Cytoplasm	Protein targeting and localization, intracellular protein traffic	Ubiquitous	Necessary for the fragmentation of Golgi stacks during mitosis and for their reassembly after mitosis. Involved in the formation of the transitional endoplasmic reticulum.	Yes - all rat samples
3	3	Q9NZ08	TYPE 1 TUMOR NECROSIS FACTOR RECEPTOR SHEDDING AMINOPEPTIDASE REGULATOR ISOFORM A	107841	Secreted	Protease	Ubiquitous	May play a role in the inactivation of peptide hormones. May be involved in the regulation of blood pressure.	
3	3	P00736	COMPLEMENT C1R SUBCOMPONENT PRECURSOR	80174	Secreted	Protease - complement mediated immunity	Plasma	Classical pathway of the complement system	
3	3	Q7Z7M0	ISOFORM 1 OF MULTIPLE EPIDERMAL GROWTH FACTOR-LIKE DOMAINS 8	254573	Membrane	Cell adhesion, cell structure	Widely distributed	Also known as Multiple EGF like domain protein 4	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	3	P04406	GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE	35922	Cytoplasm	Glycolysis, carbohydrate degradation	Ubiquitous		Yes - present in E12.5LV, E17.5LV
3	3	P22626	ISOFORM B1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEINS A2/B1	37430	Nucleus	mRNA processing	Ubiquitous	Forms ribonucleosome complexes	Yes - present in E14.5LV
3	3	P10909	CLUSTERIN PRECURSOR	52495	Secreted	Function unclear; has been implicated in apoptosis	Ubiquitous	Seems to be able to bind to cells, membranes and hydrophobic proteins. Has been implicated in membrane lipid recycling, in apoptotic cell death, and as a stress-induced secreted chaperone protein.	Yes - present in E14.5, E17.5LV
3	4	Q86XC7	127 KDA PROTEIN - RAN binding protein 5	126522	Intracellular - Nucleus, Cytoplasm	Nuclear-cytoplasmic transport	Ubiquitous	Involved in the import of proteins with the nuclear localization signal.	Yes - one isoform found in E12.5LV, E14.5LV, E17.5LV, 2nd isoform found in E12.5LV, E14.5 4thV, and E17.5LV
3	4	Q14568	HEAT SHOCK PROTEIN 86 (FRAGMENT)	35674	Cytoplasm	Molecular chaperone, protein folding, stress response	Ubiquitous	Heat shock protein family	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	5	P02765	ALPHA-2-HS-GLYCOPROTEIN PRECURSOR	39325	Secreted, extracellular space, extracellular matrix	Cysteine protease inhibitor	Synthesized in liver and concentrated in bone. Secreted in plasma.	Extracellular matrix glycoprotein involved in skeletal development	Yes - present in E14.5, E17.5LV
3	3	Q14403	GAMMA-G GLOBIN (FRAGMENT)	16969	Intracellular	Oxygen Transport, Transfer - Carrier Protein	Red blood cells	Belongs to the globin family	
3	3	P00734	PROTHROMBIN PRECURSOR (FRAGMENT)	70037	Secreted	Blood clotting	Expressed by the liver and secreted in plasma	Thrombin, converts fibrinogen to fibrin and activates factors V, VII, VIII, XIII, and, in complex with thrombomodulin.	Yes - present in E14.5 4thV, E17.5LV
3	3	Q16706	ALPHA-MANNOSIDASE 2	131084	Golgi apparatus	Glycosidase	Ubiquitous	Involved in N-glycosylation	Yes - all rat samples
3	3	Q9Y6N7	ISOFORM 1 OF ROUNDABOUT HOMOLOG 1 PRECURSOR	180930	Membrane	Axon guidance receptor	Widely expressed	Receptor for SLIT1 and SLIT2 which are thought to act as molecular guidance cue in cellular migration, including axonal navigation at the ventral midline of the neural tube and projection of axons to different regions during neuronal development.	Yes - present in E14.5 4thV
3	3	Q15063	ISOFORM 1 OF PERIOSTIN PRECURSOR	93314	Secreted, extracellular space, extracellular matrix	Cell adhesion, cell structure, cell motility	Widely expressed with highest levels in aorta, stomach, lower gastrointestinal tract, placenta, uterus and breast.	Binds to heparin. Induces cell attachment and spreading and plays a role in cell adhesion	Yes - present in E14.5
3	3	P22792	CARBOXYPEPTIDASE N SUBUNIT 2 PRECURSOR	60615	Secreted	Enzyme regulator, protein stabilization	Plasma	Binds to catalytic subunit, stabilizes it and keeps it in circulation	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	3	P55786	PUROMYCIN-SENSITIVE AMINOPEPTIDASE	103276	Intracellular - Nucleus, Cytoplasm	Protease	Widely distributed	Involved in proteolytic events essential for cell growth and viability. May act as regulator of neuropeptide activity.	Yes - all rat samples
3	3	P62736	ACTIN, AORTIC SMOOTH MUSCLE	42009	Cytoplasm	Cell motility	Widely distributed	Actins are highly conserved proteins that are involved in various types of cell motility and are ubiquitously expressed in all eukaryotic cells	
3	3	P02452	COLLAGEN ALPHA-1(I) CHAIN PRECURSOR	138883	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Forms the fibrils of tendon, ligaments and bones	Component of connective tissue	Yes - all rat samples
3	3	Q16819	MEPRIN A SUBUNIT ALPHA PRECURSOR	84368	Membrane	Protease	Widely distributed, highly expressed in gut	Cell surface endopeptidase	
3	13	P23471	PROTEIN TYROSINE PHOSPHATASE, RECEPTOR-TYPE, ZETA1 PRECURSOR	254587	Membrane	Transmembrane receptor protein	Specifically expressed in the central nervous system	May be involved in the regulation of specific developmental processes in the CNS	
3	4	O95373	120 KDA PROTEIN - Importin 7	119702	Intracellular - Nucleus, Cytoplasm	Nuclear-cytoplasmic transport	Ubiquitous	Involved in the import of proteins with the nuclear localization signal.	Yes - present in E12.5LV, E17.5LV
3	3	Q9HBB3	DNA-BINDING PROTEIN TAXREB107	32891	Intracellular	Protein biosynthesis - Ribonucleoprotein	Ubiquitous		
3	3	Q13263	TRIPARTITE MOTIF-CONTAINING 28 PROTEIN	86550	Nucleus	Transcriptional Regulation	Ubiquitous	Acts as a transcriptional corepressor	Yes - present in E12.5LV, E14.5LV

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
3	3	P51693	AMYLOID-LIKE PROTEIN 1 PRECURSOR	72176	Cell membrane, Cytoplasm	May play a role in postsynaptic function	Cerebral cortex	Can regulate neurite outgrowth through binding to components of the extracellular matrix.	Yes - present in E14.5 4thV, E17.5LV
3	4	P20849	ISOFORM 1 OF COLLAGEN ALPHA-1(X) CHAIN PRECURSOR	91855	Secreted, extracellular space, extracellular matrix	Extracellular matrix structural constituent	Structural component of hyaline cartilage and vitreous of the eye	Component of connective tissue	
3	3	Q14112	NIDOGEN-2 PRECURSOR	151395	Secreted, extracellular space, extracellular matrix	Cell adhesion	Heart, placenta and bone	Cell adhesion glycoprotein which is widely distributed in basement membranes	Yes - all rat samples
3	3	Q6EMK4	VASORIN PRECURSOR	71713	Membrane	Inhibitor of TGF-beta signaling	Aorta, kidney, placenta, brain, heart, liver, lung and skeletal muscle.	Modulates the arterial response to injury	
3	3	P11142	ISOFORM 1 OF HEAT SHOCK COGNATE 71 KDA PROTEIN	70898	Cytoplasm	Chaperone	Ubiquitous	Belongs to the heat shock protein 70 family	Yes - present in E12.5LV, E14.5LV, E17.5LV
3	3	Q92823	ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR	144074	Membrane	Cell adhesion, involved in neuron-neuron adhesion	Widely distributed, highly expressed in brain	Belongs to the immunoglobulin super family	Yes - all rat samples
2	2	P30086	PHOSPHATIDYLETHANO LAMINE-BINDING PROTEIN 1	20926	Cytoplasm	Serine Protease Inhibitor	Ubiquitous	Serine protease inhibitor which inhibits thrombin, neuropsin and chymotrypsin.	Yes - present in E17.5LV
2	4	Q6PIH6	IGKV1-5 (Immunoglobulin kappa variable 1-5) PROTEIN	26234	Membrane	MHC class I protein complex	Unknown	Antigen processing and presentation of peptides	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P08697	ALPHA-2-ANTIPLASMIN PRECURSOR	55064	Secreted	Serine Protease Inhibitor - Blood coagulation	Plasma	Belongs to the serpin family	Yes - all rat samples
2	2	Q02487	ISOFORM 2A OF DESMOCOLLIN-2 PRECURSOR	99962	Membrane	Cell adhesion	Expressed in epithelia, myocardium and lymph nodes	Component of intercellular desmosome junctions.	
2	2	P49736	DNA REPLICATION LICENSING FACTOR MCM2	101896	Nucleus	DNA binding, cell cycle progression	Ubiquitous	Acts as a factor that allows the DNA to undergo a single round of replication per cell cycle. Required for the entry in S phase and for cell division	Yes - present in E12.5LV, E17.5LV
2	2	P26022	PENTRAXIN-RELATED PROTEIN PTX3 PRECURSOR	42020	Secreted	Inflammatory response	Widely distributed, highly expressed in connective tissue	Plays a role in the regulation of innate resistance to pathogens, and inflammatory reactions.	
2	2	O60462	ISOFORM A22 OF NEUROFILIN-2 PRECURSOR	104831	Membrane	Vascular endothelial growth factor receptor activity - involved in axon guidance	Widely distributed	High affinity receptor for semaphorins 3C, 3F, VEGF-165 and VEGF-145 isoforms of VEGF, and the PLGF-2 isoform of PGF	Yes - present in E14.5 4thV
2	4	P51884	LUMICAN PRECURSOR	38429	Secreted, extracellular space, extracellular matrix	ECM structural component	Widely distributed, highly expressed in cornea	Binds to laminin	Yes - all rat samples
2	2	P01042	ISOFORM HMW OF KININOGEN-1 PRECURSOR	71945	Secreted, extracellular space, extracellular matrix	Cysteine protease inhibitor	Plasma	Bradykinin is released from kininogen by plasma kallikrein. Plays an important role in blood coagulation.	Yes - all rat samples
2	2	P55060	ISOFORM 1 OF EXPORTIN-2	110417	Intracellular - Nucleus, Cytoplasm	Nuclear-cytoplasmic shuttling	Ubiquitous	Export receptor for importin-alpha.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P06748	ISOFORM 2 OF NUCLEOPHOSMIN	29465	Nucleus, nucleolus	rRNA metabolism	Ubiquitous	Associated with nucleolar ribonucleoprotein structures and bind single-stranded nucleic acids. It may function in the assembly and/or transport of ribosome	
2	2	Q5UE57	ALCADEIN BETA	107033	Membrane	Cell adhesion	Widely distributed, expressed highly in brain	Calcium ion binding	
2	2	P27348	14-3-3 PROTEIN THETA	27764	Cytoplasm	Chaperone, signal transduction	Widely distributed, expressed highly in brain, heart and pancreas	Adapter protein implicated in the regulation of a large spectrum of both general and specialized signaling pathways.	Yes - present in E12.5LV, E14.5LV, E17.5LV
2	2	P36578	60S RIBOSOMAL PROTEIN L4	47566	Cytoplasm	Protein biosynthesis	Ubiquitous	Cytosolic large ribosomal subunit	Yes - present in E12.5LV, E14.5LV
2	2	P08253	72 KDA TYPE IV COLLAGENASE PRECURSOR	73882	Secreted, extracellular space, extracellular matrix	Hydrolase, proteolysis	Fibroblasts	Cleaves gelatin and collagen	
2	2		HYPOTHETICAL PROTEIN LOC345651	42003	Unknown	Unknown	Unknown	Unknown	
2	2	P08572	COLLAGEN ALPHA-2(IV) CHAIN PRECURSOR	167535	Secreted, extracellular space, extracellular matrix	Extracellular matrix structural constituent	Widely distributed	Type IV collagen is the major structural component of glomerular basement membranes, forming a meshwork together with laminins, proteoglycans and entactin/nidogen.	Yes - present in E12.5LV, E14.5
2	2	P52701	ISOFORM GTBP-ALT OF DNA MISMATCH REPAIR PROTEIN MSH6	120563	Nucleus	DNA mismatch repair	Ubiquitous	Restores repair of base-base and single-nucleotide insertion-deletion mismatches.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P14625	ENDOPLASMIN PRECURSOR	92469	Endoplasmic reticulum	Chaperone, protein folding	Widely distributed	Molecular chaperone that functions in the processing and transport of secreted proteins	Yes - all rat samples (TUMOR REJECTION ANTIGEN GP96)
2	2	P05067	ISOFORM APP770 OF AMYLOID BETA A4 PROTEIN PRECURSOR (FRAGMENT)	86943	Membrane. After alpha-secretase cleavage, soluble APP is released into the extracellular space and the C-terminal is internalized to endosomes and lysosomes.	Cell surface receptor involved in neurite growth, neuronal adhesion and axonogenesis.	Expressed in all fetal tissues examined with highest levels in brain, kidney, heart and spleen.	During neuronal differentiation, the Thr-743 phosphorylated form is located mainly in growth cones, moderately in neurites and sparingly in the cell body. Defects in APP are a cause of autosomal dominant Alzheimer disease.	Yes - present in E12.5LV, E14.5 4thV, E17.5LV
2	2	P09651	HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A1 ISOFORM B	38747	Intracellular - Nucleus, Cytoplasm	Component of ribonucleosomes. Nuclear mRNA splicing	Ubiquitous	Involved in the packaging of pre-mRNA into hnRNP particles, transport of poly(A) mRNA from the nucleus to the cytoplasm and may modulate splice site selection.	Yes - present in E12.5LV
2	2	P61978	ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN K	50976	Intracellular - Nucleus, Cytoplasm	RNA processing	Ubiquitous	One of the major pre-mRNA-binding proteins. Binds tenaciously to poly(C) sequences.	
2	2	P84077	ADP-RIBOSYLATION FACTOR 1	20566	Membrane - Golgi	Protein trafficking	Ubiquitous	Modulates vesicle budding and uncoating within the Golgi complex.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P01034	CYSTATIN C PRECURSOR	15799	Secreted, extracellular space, extracellular matrix	Cysteine protease inhibitor	Widely distributed, highly expressed in epididymis, vas deferens, brain, thymus, and ovary	Important regulator of cysteine proteases in a number of physiologic functions	Yes - all rat samples
2	2	P68371	TUBULIN BETA-2C CHAIN	49831	Intracellular	Cell structure, cell mobility, chromosome segregation, intracellular protein traffic	Widely distributed	Tubulin is the major constituent of microtubules	Yes - all rat samples
2	2	P08123	COLLAGEN ALPHA-2(I) CHAIN PRECURSOR	129412	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Forms the fibrils of tendon, ligaments and bones	Involved in skeletal development	Yes - all rat samples
2	4	P01842	IGLC1 PROTEIN	24793	Membrane	Immune response antigen binding	Ubiquitous	MHC class I protein complex antigen processing and presentation.	
2	2	P62424	60S RIBOSOMAL PROTEIN L7A	29864	Cytoplasm	Protein biosynthesis	Ubiquitous	Cytosolic large ribosomal subunit	Yes - present in E12.5LV, E17.5LV
2	2	P24043	LAMININ ALPHA 2 SUBUNIT PRECURSOR	343905	Secreted, extracellular space, extracellular matrix	Extracellular matrix linker protein-mediated signaling	Placenta, striated muscle, peripheral nerve, cardiac muscle, pancreas, lung, spleen, kidney, adrenal gland, skin, testis, meninges, choroid plexus, and some other regions of the brain	Laminin is thought to mediate the attachment, migration and organization of cells into tissues during embryonic development by interacting with other extracellular matrix components.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	3	P04196	HISTIDINE-RICH GLYCOPROTEIN PRECURSOR	59578	Secreted	Function unknown	Expressed by the liver and secreted in plasma	It binds heme, dyes and divalent metal ions. It can inhibit rosette formation and is known to interact with heparin, thrombospondin, and the lysine-binding site of plasminogen. On the basis of its homology with HMW kininogen, the His-rich region of this protein may mediate the contact activation phase of intrinsic blood coagulation cascade.	Yes - present in E12.5LV, E14.5LV
2	2	P62826	GTP-BINDING NUCLEAR PROTEIN RAN	24292	Intracellular - Nucleus, Cytoplasm	Nuclear-cytoplasmic shuttling	Ubiquitous	Required for the import of protein into the nucleus and also for RNA export.	Yes - all rat samples
2	2	P69905	HEMOGLOBIN SUBUNIT ALPHA	15126	Intracellular	Oxygen Transport, Transfer - Carrier Protein	Red blood cells	Involved in oxygen transport from the lung to the various peripheral tissues	Yes - present in E12.5LV, E17.5LV
2	2	P68871	HEMOGLOBIN SUBUNIT BETA	15867	Intracellular	Oxygen Transport, Transfer - Carrier Protein	Red blood cells	Involved in oxygen transport from the lung to the various peripheral tissues	Yes - present in E17.5LV
2	2	P08603	ISOFORM 1 OF COMPLEMENT FACTOR H PRECURSOR	139070	Secreted	Complement activation	Expressed by the liver and secreted in plasma	Involved in the regulation of complement activation	Yes - all rat samples
2	2	P53618	COATOMER SUBUNIT BETA	107139	Cytoplasm. Golgi apparatus	Vesicle mediated transport	Ubiquitous	Coatamer complex is required for budding from Golgi membranes, and is essential for the retrograde Golgi-to-ER transport of dilysine-tagged proteins.	Yes - present in E12.5LV, E17.5LV
2	2	P53675	ISOFORM 1 OF CLATHRIN HEAVY CHAIN 2	187030	Cytoplasmic vesicle; cytoplasmic vesicle membrane	Receptor-mediated endocytosis	Ubiquitous	Involved in the formation of clathrin coated vesicles during vesicle endocytosis	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P09871	COMPLEMENT C1S SUBCOMPONENT PRECURSOR	76684	Secreted	Serine protease	Plasma	Immune response - Complement activation	Yes - present in E17.5LV
2	2	Q8NBJ4	GOLGI PHOSPHOPROTEIN 2	46273	Golgi apparatus	Function unknown	Widely expressed	Cellular response protein to viral infection	
2	2	P13639	ELONGATION FACTOR 2	95207	Cytoplasm	Protein biosynthesis	Ubiquitous	Promotes translocation of protein chain from A site to P site on ribosome	Yes - all rat samples
2	2	P68366	TUBULIN ALPHA-1 CHAIN	49924	Intracellular	Cell structure, cell mobility, intracellular protein traffic	Widely distributed	Tubulin is the major constituent of microtubules	Yes - all rat samples
2	2	Unknown	22 KDA PROTEIN	22066	Unknown	Unknown	Unknown	Unknown	
2	2	P45974	ISOFORM LONG OF UBIQUITIN CARBOXYL-TERMINAL HYDROLASE ₅	95786	Intracellular - Lysosome	Protease	Ubiquitous	Cleaves linear and branched multiubiquitin polymers with a marked preference for branched polymers.	Yes - present in E14.5LV, E17.5LV
2	2	Q14008	CYTOSKELETON-ASSOCIATED PROTEIN 5	225509	Intracellular - centrosome	Centrosome organization and biogenesis, and establishment and maintenance of microtubule cytoskeleton polarity	Skeletal muscle, brain, heart, placenta, lung, liver, kidney and pancreas	Plays a major role in organizing spindle poles	
2	7	Q8IUJ7	ALB PROTEIN	45160	Secreted	Transport, Transfer/Carrier	Plasma	Serum albumin, the main protein of plasma, has a good binding capacity for water, Ca(2+), Na(+), K(+), fatty acids, hormones, bilirubin and drugs. Its main function is the regulation of the colloidal osmotic pressure of blood.	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	3	P55285	ISOFORM 1 OF CADHERIN-6 PRECURSOR	88309	Membrane	Cell adhesion	Highly expressed in ovary, brain, cerebellum, and kidney	Also known as Kidney cadherin	Yes - all rat samples
2	2	P23246	ISOFORM LONG OF SPLICING FACTOR, PROLINE- AND GLUTAMINE-RICH	76149	Nucleus	mRNA processing	Ubiquitous	DNA- and RNA binding protein, involved in several nuclear processes. Essential pre-mRNA splicing factor required early in spliceosome formation.	
2	2	P04275	VON WILLEBRAND FACTOR PRECURSOR	309299	Secreted	Cell adhesion - Blood clotting	Plasma	Important in the maintenance of hemostasis, it promotes adhesion of platelets to the sites of vascular injury. Also acts as a chaperone for coagulation factor VIII, delivering it to the site of injury, stabilizing its heterodimeric structure and protecting it from premature clearance from plasma.	Yes - all rat samples
2	3	P01011	ISOFORM 1 OF ALPHA-1-ANTITRYPSIN PRECURSOR	47651	Secreted	Serine protease inhibitor	Plasma	Belongs to the serpin family	
2	2	P09211	GLUTATHIONE S-TRANSFERASE P	23225	Cytoplasm	Transferase	Ubiquitous	Involved in detoxifying compounds by linking glutathione to hydrophobic substances	Yes - present in E12.5LV
2	2	P33991	DNA REPLICATION LICENSING FACTOR MCM4	96558	Nucleus	Involved in the control of DNA replication	Ubiquitous	Involved in chromatin binding	
2	8	P23142	ISOFORM C OF FIBULIN-1 PRECURSOR	74462	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Widely expressed during embryonic development	Involved in a number of various ECM related functions during development including cell adhesion, migration, and ECM architecture. Binds to laminin and nidogen (both found in the CSF).	Yes - all rat samples

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	3	Q60847	ISOFORM LONG OF COLLAGEN ALPHA-1(XII) CHAIN PRECURSOR	333194	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Widely distributed	Component of connective tissue	
2	3	Q24JP5	TRANSMEMBRANE PROTEIN 132A ISOFORM B	110110	Membrane	Integral to membrane	Unknown	Unknown	
2	2	Q16610	EXTRACELLULAR MATRIX PROTEIN 1 PRECURSOR	60674	Secreted, extracellular space, extracellular matrix	Signal transduction activity	Widely distributed	Positive regulation of I-kappaB kinase/NF-kappaB cascade	
2	2	P13671	COMPLEMENT COMPONENT C6 PRECURSOR	105752	Secreted	Immune response - complement pathway	Plasma	Involved in the formation of the lytic complex, which inserts into plasma membranes and causes cells to lyse.	Yes - present in E17.5LV
2	2	P10586	RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE F PRECURSOR	211845	Membrane	Transmembrane receptor protein involved in cell adhesion	Widely distributed	Signaling molecule involved in cell growth and differentiation	Yes-LAR RECEPTOR-LINKED TYROSINE PHOSPHATASE present in all rat samples
2	2	Q9HCU4	CADHERIN EGF LAG SEVEN-PASS G-TYPE RECEPTOR 2 PRECURSOR	317453	Membrane	G-protein coupled receptor protein signaling pathway	Highest expression in brain and testis	May have an important role in cell/cell signaling during nervous system formation	Yes - present in E12.5LV, E14.5LV
2	2	P62917	60S RIBOSOMAL PROTEIN L8	27893	Cytoplasm	Protein Biosynthesis	Ubiquitous	Ribosomal structural protein	Yes - present in E12.5LV, E14.5 4thV

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	P33176	KINESIN HEAVY CHAIN	109685	Intracellular	Microtubule motor activity	Ubiquitous	Microtubule-dependent motor required for normal distribution of mitochondria and lysosomes	Yes - present in E17.5LV
2	2	P62258	14-3-3 PROTEIN EPSILON	29174	Cytoplasm	Chaperone, signal transduction - intracellular signaling cascade	Ubiquitous	Adaptor protein implicated in the regulation of a large spectrum of both general and specialized signaling pathway	Yes - all rat samples
2	4	Q8NF17	FLJ00385 PROTEIN (FRAGMENT)	56111	Membrane	Unknown	Unknown	IgG like protein	
2	2	P43243	MATRIN-3	94623	Nucleus	Function unclear	Ubiquitous	May play a role in trascription, nuclear structure, or nuclear retention of defective RNAs	Yes - present in E12.5LV, E17.5LV
2	2	P15924	ISOFORM DPI OF DESMOPLAKIN	331776	Membrane	Cell adhesion, cell junctions	Isoform DPI is a constituent of all desmosomes	Major high molecular weight protein of desmosomes	Yes - present in E12.5LV, E17.5LV
2	2	P19652	ALPHA-1-ACID GLYCOPROTEIN 2 PRECURSOR	23603	Secreted	Immune response - acute phase	Plasma	Appears to function in modulating the activity of the immune system during the acute-phase reaction	
2	2	P60842	EUKARYOTIC INITIATION FACTOR 4A-I	46154	Intracellular	Protein biosynthesis	Ubiquitous	Required for mRNA binding to ribosome	
2	2	P00338	LACTATE DEHYDROGENASE A	36689	Cytoplasm	Anaerobic glycolysis	Widely distributed, highly expressed in muscle tissue	Catalyzes the conversion of lactate and NAD to pyruvate and NADH	Yes - present in E12.5LV, E14.5
2	2	Q6UX71	ISOFORM 1 OF PLEXIN DOMAIN-CONTAINING PROTEIN 2 PRECURSOR	59583	Membrane	Cell surface endothelial marker	Endothelial cells	May play a role in tumor angiogenesis	
2	2	P30041	PEROXIREDOXIN-6	24904	Cytoplasm	Oxidoreductase, Peroxidase	Ubiquitous	Involved in redox regulation of the cell in response to oxidative stress.	

Number of unique peptides from protein	Total number of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue Specificity	Notes	Found in Rat CSF
2	2	O14594	NEUROCAN CORE PROTEIN PRECURSOR	142973	Secreted, extracellular space, extracellular matrix	Extracellular matrix protein-mediated signaling, cell adhesion, cell motility	Brain	May modulate neuronal adhesion and neurite growth during development by binding to neural cell adhesion molecules.	Yes - present in E14.5 4thV, E17.5LV
2	2	Q12860	ISOFORM 1 OF CONTACTIN-1 PRECURSOR	113320	Membrane	Cell adhesion	Widely distributed, highly expressed in brain	Mediates cell surface interactions during nervous system development. Involved in the formation of axon-glial junctions in myelinated peripheral nerves and in the signaling between axons and myelinating glial cells. Participates in oligodendrocytes generation by acting as a ligand of NOTCH1.	Yes - present in E17.5LV
2	2	Q8TF66	LEUCINE-RICH REPEAT-CONTAINING PROTEIN 15 PRECURSOR	64396	Membrane	Unknown	Brain and placenta	Unknown	

Table 2. Protein list from mass spectrometry CS19 human CSF.

Protein matches for CS19 human CSF	
Number of unique peptides from protein	Total number of peptides
194	571
120	176
68	168
53	58
52	66
48	54
39	72
36	73

Protein matches for CS19 human CSF

Homo sapiens (Human) APOLIPOPROTEIN B-100 PRECURSOR. [MASS=515563]

Homo sapiens (Human) DYNEIN HEAVY CHAIN, CYTOSOLIC. [MASS=532408]

Homo sapiens (Human) MICROTUBULE-ASSOCIATED PROTEIN 1B. [MASS=270620]

Homo sapiens (Human) MYOSIN-10. [MASS=228939]

Homo sapiens (Human) FILAMIN A, ALPHA. [MASS=280018]

Homo sapiens (Human) ISOFORM 1 OF SPECTRIN ALPHA CHAIN, BRAIN. [MASS=284539]

Homo sapiens (Human) FATTY ACID SYNTHASE. [MASS=273400]

Homo sapiens (Human) VIMENTIN. [MASS=53520]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
36	36	Homo sapiens (Human) ISOFORM LONG OF SPECTRIN BETA CHAIN, BRAIN 1. [MASS=274631]
36	72	Homo sapiens (Human) NESTIN. [MASS=176706]
35	172	Homo sapiens (Human) ALB PROTEIN. [MASS=71705]
34	127	Homo sapiens (Human) SEROTRANSFERRIN PRECURSOR. [MASS=77050]
31	41	Homo sapiens (Human) Heat shock 70kDa protein 5. [MASS=72422]
31	45	Homo sapiens (Human) ISOFORM 1 OF FIBRONECTIN PRECURSOR. [MASS=262607]
30	36	Homo sapiens (Human) MOESIN. [MASS=67689]
29	84	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP761K0511. [MASS=84843]
28	58	Homo sapiens (Human) ISOFORM 1 OF HEAT SHOCK COGNATE 71 KDA PROTEIN. [MASS=70898]
27	46	Homo sapiens (Human) ELONGATION FACTOR 2. [MASS=95207]
27	30	Homo sapiens (Human) PRE-MRNA-PROCESSING-SPLICING FACTOR 8. [MASS=273600]
26	44	Homo sapiens (Human) APOLIPOPROTEIN A-IV PRECURSOR. [MASS=45399]
26	102	Homo sapiens (Human) GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE. [MASS=35922]
26	29	Homo sapiens (Human) ISOFORM 1 OF DNA-DEPENDENT PROTEIN KINASE CATALYTIC SUBUNIT. [MASS=469089]
25	109	Homo sapiens (Human) TUBULIN BETA-2C CHAIN. [MASS=49831]
25	41	Homo sapiens (Human) CLATHRIN HEAVY CHAIN 1. [MASS=191615]
24	27	Homo sapiens (Human) MYOSIN-9. [MASS=226401]
23	30	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT BETA. [MASS=57357]
23	31	Homo sapiens (Human) ENDOPLASMIN PRECURSOR. [MASS=92469]
23	35	Homo sapiens (Human) ISOFORM 1 OF CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1. [MASS=136376]
23	23	Homo sapiens (Human) ISOFORM 2 OF MICROTUBULE-ACTIN CROSSLINKING FACTOR 1, ISOFORMS 1/2/3/5. [MASS=620418]
23	28	Homo sapiens (Human) ISOFORM 2 OF HECT, UBA AND WWE DOMAIN-CONTAINING PROTEIN 1. [MASS=480198]
22	77	Homo sapiens (Human) CREATINE KINASE B-TYPE. [MASS=42844]
22	26	Homo sapiens (Human) KINESIN HEAVY CHAIN. [MASS=109685]
22	34	Homo sapiens (Human) IMPORTIN BETA-1 SUBUNIT. [MASS=97170]
22	31	Homo sapiens (Human) DNA REPLICATION LICENSING FACTOR MCM2. [MASS=101896]
22	24	Homo sapiens (Human) STRUCTURAL MAINTENANCE OF CHROMOSOME 3. [MASS=141542]
22	42	Homo sapiens (Human) APOLIPOPROTEIN A-I PRECURSOR. [MASS=30778]
21	44	Homo sapiens (Human) ISOFORM M1 OF PYRUVATE KINASE ISOZYMES M1/M2. [MASS=57931]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
21	35	Homo sapiens (Human) DPYSL3 PROTEIN. [MASS=73910]
21	34	Homo sapiens (Human) RAN BINDING PROTEIN 5. [MASS=125545]
21	35	Homo sapiens (Human) TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE. [MASS=89191]
21	167	Homo sapiens (Human) ALPHA-FETOPROTEIN PRECURSOR. [MASS=68678]
20	26	Homo sapiens (Human) DIHYDROXYIMIDINASE-RELATED PROTEIN 1. [MASS=62184]
20	27	Homo sapiens (Human) ATP-DEPENDENT RNA HELICASE A. [MASS=140881]
20	30	Homo sapiens (Human) MATRIN-3. [MASS=94623]
19	35	Homo sapiens (Human) RAB GDP DISSOCIATION INHIBITOR ALPHA. [MASS=50583]
19	24	Homo sapiens (Human) APOLOPROTEIN E PRECURSOR. [MASS=36154]
19	20	Homo sapiens (Human) C-1-TETRAHYDROFOLATE SYNTHASE, CYTOPLASMIC. [MASS=101428]
19	29	Homo sapiens (Human) ISOFORM LONG OF SPLICING FACTOR, PROLINE- AND GLUTAMINE-RICH. [MASS=76149]
19	35	Homo sapiens (Human) ATP-DEPENDENT DNA HELICASE 2 SUBUNIT 2. [MASS=82573]
19	23	Homo sapiens (Human) ISOFORM 1 OF MICROTUBULE-ASSOCIATED PROTEIN 2. [MASS=199539]
19	22	Homo sapiens (Human) PROTEIN DISULFIDE-ISOMERASE A4 PRECURSOR. [MASS=72932]
18	38	Homo sapiens (Human) FIBRINOGEN BETA CHAIN PRECURSOR. [MASS=55928]
18	23	Homo sapiens (Human) PHOSPHOGLYCERATE KINASE 1. [MASS=44483]
18	18	Homo sapiens (Human) DNA REPLICATION LICENSING FACTOR MCM6. [MASS=92889]
18	37	Homo sapiens (Human) ISOFORM 1 OF NUCLEAR AUTOANTIGENIC SPERM PROTEIN. [MASS=85238]
18	38	Homo sapiens (Human) TRIPARTITE MOTIF-CONTAINING 28 PROTEIN. [MASS=88550]
18	20	Homo sapiens (Human) ISOFORM 1 OF GENERAL TRANSCRIPTION FACTOR II-I. [MASS=112416]
18	35	Homo sapiens (Human) NCL PROTEIN. [MASS=51641]
18	31	Homo sapiens (Human) INTER-ALPHA-TRYPsin INHIBITOR HEAVY CHAIN H2 PRECURSOR. [MASS=106436]
18	29	Homo sapiens (Human) ISOFORM 5 OF INTERLEUKIN ENHANCER-BINDING FACTOR 3. [MASS=74607]
17	30	Homo sapiens (Human) HEAT SHOCK 70 KDA PROTEIN 4. [MASS=94300]
17	19	Homo sapiens (Human) LUPUS LA PROTEIN. [MASS=46837]
17	89	Homo sapiens (Human) TUBULIN ALPHA-1 CHAIN. [MASS=49924]
17	24	Homo sapiens (Human) POLY [ADP-RIBOSE] POLYMERASE 1. [MASS=112953]
17	18	Homo sapiens (Human) LEUCYL-TRNA SYNTHETASE, CYTOPLASMIC. [MASS=134466]
17	21	Homo sapiens (Human) PUROMYCIN-SENSITIVE AMINOPEPTIDASE. [MASS=103276]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
17	17	Homo sapiens (Human) ISOFORM 1 OF STRUCTURAL MAINTENANCE OF CHROMOSOME 2-LIKE 1 PROTEIN. [MASS=135781]
16	126	Homo sapiens (Human) ALPHA-1-ANTITRYPSIN PRECURSOR. [MASS=46737]
16	19	Homo sapiens (Human) EUKARYOTIC INITIATION FACTOR 4A-1. [MASS=46154]
16	20	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT ETA. [MASS=59367]
16	21	Homo sapiens (Human) ISOCITRATE DEHYDROGENASE [NADP] CYTOPLASMIC. [MASS=46659]
16	17	Homo sapiens (Human) KINESIN HEAVY CHAIN ISOFORM 5C. [MASS=109495]
16	35	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN U. [MASS=88814]
16	18	Homo sapiens (Human) SPLICING FACTOR 3B SUBUNIT 1. [MASS=145815]
16	18	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 2. [MASS=100200]
16	17	Homo sapiens (Human) CHAPERONIN CONTAINING TCP1, SUBUNIT 8. [MASS=59779]
15	17	Homo sapiens (Human) ATP-CITRATE SYNTHASE. [MASS=120825]
15	53	Homo sapiens (Human) ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR. [MASS=51512]
15	18	Homo sapiens (Human) ISOFORM 1 OF EXPORTIN-2. [MASS=110417]
15	22	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN M ISOFORM A. [MASS=77516]
15	22	Homo sapiens (Human) ISOFORM 2 OF FAR UPSTREAM ELEMENT-BINDING PROTEIN 1. [MASS=68605]
15	18	Homo sapiens (Human) SPLICING FACTOR 3 SUBUNIT 1. [MASS=88886]
15	43	Homo sapiens (Human) HEAT SHOCK PROTEIN HSP 90-ALPHA 2. [MASS=98113]
15	23	Homo sapiens (Human) 14-3-3 PROTEIN EPSILON. [MASS=29174]
15	15	Homo sapiens (Human) ISOFORM 1 OF VINCULIN. [MASS=116591]
15	18	Homo sapiens (Human) ALANYL-TRNA SYNTHETASE. [MASS=106801]
14	18	Homo sapiens (Human) DNA REPLICATION LICENSING FACTOR MCM4. [MASS=96558]
14	14	Homo sapiens (Human) ISOFORM 1 OF SPECTRIN BETA CHAIN, BRAIN 2. [MASS=271295]
14	21	Homo sapiens (Human) FAR UPSTREAM ELEMENT-BINDING PROTEIN 2. [MASS=72709]
14	14	Homo sapiens (Human) PROTEIN DISULFIDE-ISOMERASE A3 PRECURSOR. [MASS=56782]
14	19	Homo sapiens (Human) RAB GDP DISSOCIATION INHIBITOR BETA. [MASS=50663]
14	21	Homo sapiens (Human) DEAH (ASP-GLU-ALA-HIS) BOX POLYPEPTIDE 15. [MASS=92829]
14	22	Homo sapiens (Human) LACTATE DEHYDROGENASE A. [MASS=36689]
14	22	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 10. [MASS=166569]
14	21	Homo sapiens (Human) ISOFORM BETA OF HEAT-SHOCK PROTEIN 105 KDA. [MASS=92116]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
14	25	Homo sapiens (Human) ISOFORM 1 OF POLYADENYLATE-BINDING PROTEIN 1. [MASS=70671]
13	19	Homo sapiens (Human) 6-PHOSPHOGLUCONATE DEHYDROGENASE, DECARBOXYLATING. [MASS=53009]
13	30	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN K. [MASS=50976]
13	14	Homo sapiens (Human) DREBRIN. [MASS=71294]
13	14	Homo sapiens (Human) EXPORTIN-1. [MASS=123386]
13	13	Homo sapiens (Human) SMARCA4 ISOFORM 2. [MASS=188149]
13	15	Homo sapiens (Human) HYDROXYMETHYLGLUTARYL-COA SYNTHASE, CYTOPLASMIC. [MASS=57294]
13	16	Homo sapiens (Human) RIBONUCLEOSIDE-DIPHOSPHATE REDUCTASE LARGE SUBUNIT. [MASS=90070]
13	28	Homo sapiens (Human) HNRPA2B1 PROTEIN. [MASS=28412]
13	45	Homo sapiens (Human) ENOLASE 1. [MASS=47169]
13	15	Homo sapiens (Human) ALPHA-ACTININ-1. [MASS=103058]
13	29	Homo sapiens (Human) DIHYDROPYRIMIDINASE-LIKE 2. [MASS=67017]
13	15	Homo sapiens (Human) DIHYDROPYRIMIDINASE-RELATED PROTEIN 4. [MASS=61878]
13	20	Homo sapiens (Human) INSULIN-LIKE GROWTH FACTOR 2 MRNA BINDING PROTEIN 1. [MASS=63481]
13	17	Homo sapiens (Human) ISOFORM 2 OF NEUTRAL ALPHA-GLUCOSIDASE AB PRECURSOR. [MASS=109438]
13	13	Homo sapiens (Human) ISOFORM P150 OF DYNACTIN-1. [MASS=141695]
13	14	Homo sapiens (Human) SPLICING FACTOR 3B SUBUNIT 2. [MASS=100228]
13	25	Homo sapiens (Human) HEMOGLOBIN SUBUNIT EPSILON. [MASS=16072]
13	17	Homo sapiens (Human) DNA REPLICATION LICENSING FACTOR MCM5. [MASS=82286]
13	18	Homo sapiens (Human) FASCIN. [MASS=54399]
13	15	Homo sapiens (Human) GLUTAMYL-PROLYL TRNA SYNTHETASE. [MASS=170591]
13	14	Homo sapiens (Human) DNA REPLICATION LICENSING FACTOR MCM3. [MASS=90981]
12	25	Homo sapiens (Human) UBIQUITIN-ACTIVATING ENZYME E1. [MASS=117849]
12	68	Homo sapiens (Human) TRANSTHYRETIN PRECURSOR. [MASS=15887]
12	18	Homo sapiens (Human) SPLICING FACTOR 3B SUBUNIT 3. [MASS=135592]
12	13	Homo sapiens (Human) PHOSPHOFRUCTOKINASE, MUSCLE. [MASS=85183]
12	41	Homo sapiens (Human) TUBULIN BETA-3 CHAIN. [MASS=50433]
12	12	Homo sapiens (Human) ALPHA-ACTININ-4. [MASS=104854]
12	15	Homo sapiens (Human) ISOFORM 1 OF GELSOLIN PRECURSOR. [MASS=85698]
12	14	Homo sapiens (Human) MULTIFUNCTIONAL PROTEIN ADE2. [MASS=49679]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
12	15	Homo sapiens (Human) DIHYDROPYRIMIDINASE-RELATED PROTEIN 5. [MASS=61421]
12	22	Homo sapiens (Human) ANNEXIN A5. [MASS=35806]
12	25	Homo sapiens (Human) L-LACTATE DEHYDROGENASE B CHAIN. [MASS=36507]
12	16	Homo sapiens (Human) CALNEXIN PRECURSOR. [MASS=67568]
12	23	Homo sapiens (Human) ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR. [MASS=94973]
12	18	Homo sapiens (Human) NON-POU DOMAIN-CONTAINING OCTAMER-BINDING PROTEIN. [MASS=54232]
12	13	Homo sapiens (Human) 116 KDA U5 SMALL NUCLEAR RIBONUCLEOPROTEIN COMPONENT. [MASS=109436]
12	15	Homo sapiens (Human) STRESS-INDUCED-PHOSPHOPROTEIN 1. [MASS=62639]
12	12	Homo sapiens (Human) COATOMER SUBUNIT ALPHA. [MASS=138332]
11	14	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT DELTA. [MASS=57793]
11	17	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN D0. [MASS=38434]
11	12	Homo sapiens (Human) CDNA FLJ45525 FIS, CLONE BRTHA2026311, HIGHLY SIMILAR TO PROTEIN DISULFIDE ISOMERASE A6. [MASS=53929]
11	12	Homo sapiens (Human) ATP-DEPENDENT RNA HELICASE DDX3X. [MASS=73112]
11	13	Homo sapiens (Human) 26S PROTEASE REGULATORY SUBUNIT 6A. [MASS=49204]
11	15	Homo sapiens (Human) GLYCOGEN PHOSPHORYLASE, BRAIN FORM. [MASS=96565]
11	12	Homo sapiens (Human) PROTEASOME 26S NON-ATPASE SUBUNIT 11 VARIANT (FRAGMENT). [MASS=47535]
11	11	Homo sapiens (Human) DNA DAMAGE-BINDING PROTEIN 1. [MASS=126968]
11	11	Homo sapiens (Human) RAS GTPASE-ACTIVATING-LIKE PROTEIN IQGAP1. [MASS=189252]
11	15	Homo sapiens (Human) STAPHYLOCOCCAL NUCLEASE DOMAIN-CONTAINING PROTEIN 1. [MASS=101997]
11	23	Homo sapiens (Human) UBIQUITIN-ACTIVATING ENZYME E1. [MASS=56852]
11	12	Homo sapiens (Human) ISOFORM 2 OF PROTEIN KIAA1967. [MASS=103030]
11	11	Homo sapiens (Human) ISOFORM 2 OF MICROTUBULE-ASSOCIATED PROTEIN 4. [MASS=102906]
11	14	Homo sapiens (Human) ISOFORM GTBP-ALT OF DNA MISMATCH REPAIR PROTEIN MSH6. [MASS=120563]
11	14	Homo sapiens (Human) 150 KDA OXYGEN-REGULATED PROTEIN PRECURSOR. [MASS=111335]
11	11	Homo sapiens (Human) TALDO1 PROTEIN. [MASS=35329]
11	24	Homo sapiens (Human) STATHMIN. [MASS=17171]
11	11	Homo sapiens (Human) ISOFORM 1 OF CHROMODOMAIN HELICASE-DNA-BINDING PROTEIN 4. [MASS=217991]
10	11	Homo sapiens (Human) RUVB-LIKE 2. [MASS=51025]
10	14	Homo sapiens (Human) PLASMA PROTEASE C1 INHIBITOR PRECURSOR. [MASS=55154]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
10	34	Homo sapiens (Human) HEAT SHOCK PROTEIN HSP 90-ALPHA 2. [MASS=98113]
10	10	Homo sapiens (Human) PIGMENT EPITHELIIUM-DERIVED FACTOR PRECURSOR. [MASS=46342]
10	11	Homo sapiens (Human) ISOFORM LONG OF UBIQUITIN CARBOXYL-TERMINAL HYDROLASE 5. [MASS=95786]
10	47	Homo sapiens (Human) PRO2275. [MASS=13097]
10	12	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT ZETA. [MASS=57893]
10	36	Homo sapiens (Human) MYRISTOYLATED ALANINE-RICH C-KINASE SUBSTRATE. [MASS=31423]
10	10	Homo sapiens (Human) TALIN-1. [MASS=269767]
10	11	Homo sapiens (Human) VACUOLAR PROTEIN SORTING 35. [MASS=91707]
10	12	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT EPSILON. [MASS=59671]
10	11	Homo sapiens (Human) ISOFORM 3 OF POLYPYRIMIDINE TRACT-BINDING PROTEIN 2. [MASS=58084]
10	10	Homo sapiens (Human) ISOFORM 1 OF REGULATOR OF NONSENSE TRANSCRIPTS 1. [MASS=124345]
10	10	Homo sapiens (Human) UBIQUITIN-LIKE 1-ACTIVATING ENZYME E1B. [MASS=71224]
10	16	Homo sapiens (Human) ISOFORM 1 OF CLATHRIN HEAVY CHAIN 2. [MASS=187030]
10	12	Homo sapiens (Human) SEPTIN-7. [MASS=50809]
10	14	Homo sapiens (Human) ADENYLYL CYCLASE-ASSOCIATED PROTEIN 1. [MASS=51542]
10	10	Homo sapiens (Human) VALYL-TRNA SYNTHETASE. [MASS=140476]
10	11	Homo sapiens (Human) DNA MISMATCH REPAIR PROTEIN MSH2. [MASS=104743]
10	28	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN R. [MASS=70943]
10	19	Homo sapiens (Human) FRUCTOSE-BISPHOSPHATE ALDOLASE A. [MASS=39289]
10	15	Homo sapiens (Human) THREONYL-TRNA SYNTHETASE, CYTOPLASMIC. [MASS=83435]
10	11	Homo sapiens (Human) STRESS-70 PROTEIN, MITOCHONDRIAL PRECURSOR. [MASS=73680]
10	11	Homo sapiens (Human) ELONGATION FACTOR 1-DELTA. [MASS=30891]
10	11	Homo sapiens (Human) CYTOSKELETON-ASSOCIATED PROTEIN 5. [MASS=225509]
10	11	Homo sapiens (Human) CALRETICULIN PRECURSOR. [MASS=48142]
10	13	Homo sapiens (Human) PHOSPHORIBOSYLFORMYLGLYCINAMINE SYNTHASE. [MASS=144664]
10	11	Homo sapiens (Human) ISOFORM 4 OF TUBULIN-SPECIFIC CHAPERONE D. [MASS=138597]
10	13	Homo sapiens (Human) ISOFORM B OF ARSENITE-RESISTANCE PROTEIN 2. [MASS=100276]
10	10	Homo sapiens (Human) ISOFORM 2 OF STRUCTURAL MAINTENANCE OF CHROMOSOMES 4-LIKE 1 PROTEIN. [MASS=140278]
10	13	Homo sapiens (Human) ISOFORM 1 OF RETICULON-4. [MASS=130102]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
10	45	Homo sapiens (Human) HEMOGLOBIN SUBUNIT ZETA. [MASS=15506]
10	11	Homo sapiens (Human) HSPC117 PROTEIN. [MASS=55210]
10	10	Homo sapiens (Human) ISOFORM 1 OF SQUAMOUS CELL CARCINOMA ANTIGEN RECOGNIZED BY T-CELLS 3. [MASS=109935]
10	14	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S4, X ISOFORM. [MASS=29467]
10	10	Homo sapiens (Human) TRANSKETOLASE. [MASS=67878]
9	13	Homo sapiens (Human) ISOFORM 2 OF NUCLEOPHOSMIN. [MASS=29465]
9	10	Homo sapiens (Human) UNCHARACTERIZED PROTEIN C20ORF77. [MASS=36900]
9	9	Homo sapiens (Human) T-COMPLEX PROTEIN 1 SUBUNIT ALPHA. [MASS=60344]
9	10	Homo sapiens (Human) INTERLEUKIN ENHANCER-BINDING FACTOR 2. [MASS=43062]
9	10	Homo sapiens (Human) 26S PROTEASE REGULATORY SUBUNIT 8. [MASS=45626]
9	11	Homo sapiens (Human) ISOFORM 1 OF DNA REPLICATION LICENSING FACTOR MCM7. [MASS=81308]
9	19	Homo sapiens (Human) GAMMA-ENOLASE. [MASS=47137]
9	11	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKEZP451D234. [MASS=109187]
9	23	Homo sapiens (Human) TUBULIN, BETA 2. [MASS=49907]
9	11	Homo sapiens (Human) ISOFORM 1 OF PROTEIN ARGININE N-METHYLTRANSFERASE 1. [MASS=41486]
9	12	Homo sapiens (Human) VILLIN 2. [MASS=69413]
9	11	Homo sapiens (Human) RADIXIN. [MASS=68564]
9	11	Homo sapiens (Human) ISOFORM 2 OF SWI/SNF-RELATED MATRIX-ASSOCIATED ACTIN-DEPENDENT REGULATOR OF CHROMATIN SUBFAMILY C MEMBER 2. [MASS=124841]
9	9	Homo sapiens (Human) ASPARTYL-TRNA SYNTHETASE. [MASS=57136]
9	12	Homo sapiens (Human) D-3-PHOSPHOGLYCERATE DEHYDROGENASE. [MASS=56519]
9	9	Homo sapiens (Human) CAD PROTEIN. [MASS=242984]
9	9	Homo sapiens (Human) CTP SYNTHASE 1. [MASS=66690]
9	9	Homo sapiens (Human) SERINE-THREONINE KINASE RECEPTOR-ASSOCIATED PROTEIN. [MASS=38438]
9	11	Homo sapiens (Human) ADENOSYLHOMOCYSTEINASE. [MASS=47585]
9	11	Homo sapiens (Human) ELONGATION FACTOR 1-GAMMA. [MASS=49988]
9	20	Homo sapiens (Human) CDNA FLJ45706 FIS, CLONE FEBRA2028457, HIGHLY SIMILAR TO NUCLEOLIN. [MASS=65962]
9	10	Homo sapiens (Human) CHAPERONIN CONTAINING TCP1, SUBUNIT 3 ISOFORM B. [MASS=60463]
9	12	Homo sapiens (Human) ENO1P PROTEIN. [MASS=42342]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
9	9	Homo sapiens (Human) PREDICTED: SIMILAR TO HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN U. [MASS=101752]
9	11	Homo sapiens (Human) ISOFORM SHORT OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA PRECURSOR. [MASS=163444]
9	11	Homo sapiens (Human) 26S PROTEASE REGULATORY SUBUNIT 7. [MASS=48503]
9	10	Homo sapiens (Human) PROTEIN DISULFIDE-ISOMERASE PRECURSOR. [MASS=57116]
9	11	Homo sapiens (Human) FACT COMPLEX SUBUNIT SPT16. [MASS=119914]
9	14	Homo sapiens (Human) LUMICAN PRECURSOR. [MASS=38429]
9	10	Homo sapiens (Human) PROLIFERATION-ASSOCIATED PROTEIN 2G4. [MASS=43656]
9	10	Homo sapiens (Human) IARS PROTEIN. [MASS=120627]
9	10	Homo sapiens (Human) U5 SMALL NUCLEAR RIBONUCLEOPROTEIN 200 KDA HELICASE. [MASS=244508]
9	9	Homo sapiens (Human) UBIQUITIN CARBOXYL-TERMINAL HYDROLASE 7. [MASS=128272]
9	10	Homo sapiens (Human) INTER-ALPHA-TRYPsin INHIBITOR HEAVY CHAIN H1 PRECURSOR. [MASS=101389]
9	12	Homo sapiens (Human) ATP-DEPENDENT RNA HELICASE DDX1. [MASS=82432]
9	13	Homo sapiens (Human) ISOFORM 1 OF PROBABLE ATP-DEPENDENT RNA HELICASE DDX17. [MASS=72371]
9	10	Homo sapiens (Human) RNA-BINDING PROTEIN 12. [MASS=97395]
9	9	Homo sapiens (Human) TRANSPORTIN 1. [MASS=102355]
9	9	Homo sapiens (Human) GTP-BINDING NUCLEAR PROTEIN RAN. [MASS=24292]
9	9	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S18. [MASS=17719]
9	30	Homo sapiens (Human) ACTIN, AORTIC SMOOTH MUSCLE. [MASS=42009]
9	10	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 4 GAMMA 2. [MASS=102362]
9	12	Homo sapiens (Human) SPLICING FACTOR, ARGININE/SERINE-RICH 1. [MASS=27745]
9	9	Homo sapiens (Human) PEROXIREDOXIN-1. [MASS=22110]
8	10	Homo sapiens (Human) GLUTATHIONE S-TRANSFERASE P. [MASS=23225]
8	31	Homo sapiens (Human) ACTIN, CYTOPLASMIC 1. [MASS=41737]
8	9	Homo sapiens (Human) HEAT SHOCK 70 KDA PROTEIN 1L. [MASS=70375]
8	12	Homo sapiens (Human) COFILIN-1. [MASS=18371]
8	13	Homo sapiens (Human) ANGIOTENSINOGEN PRECURSOR. [MASS=53154]
8	10	Homo sapiens (Human) GLUCOSE-6-PHOSPHATE ISOMERASE. [MASS=63016]
8	51	Homo sapiens (Human) TUBULIN BETA-2 CHAIN. [MASS=49671]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
8	12	Homo sapiens (Human) ISOFORM 1 OF CYTOSOLIC ACYL COENZYME A THIOESTER HYDROLASE. [MASS=41796]
8	10	Homo sapiens (Human) HEAT SHOCK 70 KDA PROTEIN 1. [MASS=70052]
8	9	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 12. [MASS=52773]
8	23	Homo sapiens (Human) GAMMA-G GLOBIN (FRAGMENT). [MASS=16969]
8	9	Homo sapiens (Human) 14-3-3 PROTEIN THETA. [MASS=27764]
8	8	Homo sapiens (Human) MALATE DEHYDROGENASE, MITOCHONDRIAL PRECURSOR. [MASS=35531]
8	9	Homo sapiens (Human) A-KINASE ANCHOR PROTEIN 12 ISOFORM 2. [MASS=181690]
8	8	Homo sapiens (Human) LIVER PHOSPHOFRUCTOKINASE ISOFORM A. [MASS=90577]
8	14	Homo sapiens (Human) 14-3-3 PROTEIN ZETA/Delta. [MASS=27745]
8	10	Homo sapiens (Human) ATP-DEPENDENT RNA HELICASE A. [MASS=140881]
8	15	Homo sapiens (Human) ISOFORM C1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEINS C1/C2. [MASS=32338]
8	8	Homo sapiens (Human) NUCLEOSIDE DIPHOSPHATE KINASE A. [MASS=17149]
8	8	Homo sapiens (Human) TRIPEPTIDYL-PEPTIDASE 2. [MASS=138219]
8	11	Homo sapiens (Human) RCTP1 (FRAGMENT). [MASS=26943]
8	11	Homo sapiens (Human) ISOFORM 1 OF POLYPYRIMIDINE TRACT-BINDING PROTEIN 1. [MASS=57221]
8	11	Homo sapiens (Human) CELLULAR RETINOIC ACID-BINDING PROTEIN 1. [MASS=15434]
8	8	Homo sapiens (Human) MALATE DEHYDROGENASE, CYTOPLASMIC. [MASS=36295]
8	10	Homo sapiens (Human) ESTERASE D. [MASS=31463]
8	15	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN Q. [MASS=69603]
8	12	Homo sapiens (Human) ISOFORM SHORT OF RNA-BINDING PROTEIN FUS. [MASS=53355]
8	9	Homo sapiens (Human) F-ACTIN CAPPING PROTEIN ALPHA-1 SUBUNIT. [MASS=32792]
8	10	Homo sapiens (Human) PROBABLE ATP-DEPENDENT RNA HELICASE DDX48. [MASS=46740]
8	10	Homo sapiens (Human) INORGANIC PYROPHOSPHATASE. [MASS=32660]
8	21	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A0. [MASS=30841]
8	9	Homo sapiens (Human) ISOFORM 1 OF GLUCOSAMINE--FRUCTOSE-6-PHOSPHATE AMINOTRANSFERASE [ISOMERIZING] 1. [MASS=78806]
8	10	Homo sapiens (Human) ELAV. [MASS=42417]
8	8	Homo sapiens (Human) CDNA FLJ33352 FIS, CLONE BRACE2005087, WEAKLY SIMILAR TO PRE-MRNA SPLICING HELICASE BRR2. [MASS=71472]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
8	8	Homo sapiens (Human) PREDICTED: SIMILAR TO ATP-DEPENDENT DNA HELICASE II, 70 KDA SUBUNIT (LUPUS KU AUTOANTIGEN PROTEIN P70) (KU70) (70 KDA SUBUNIT OF KU ANTIGEN) (THYROID-LUPUS AUTOANTIGEN) (TLAA) (CTC BOX BINDING FACTOR 75 KDA SUBUNIT) (CTCBF) (CTC75) ISOFORM 1. [MASS=54430]
8	11	Homo sapiens (Human) IMPORTIN-7. [MASS=119517]
8	8	Homo sapiens (Human) ISOFORM 1 OF CULLIN-3. [MASS=88930]
8	8	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 6. [MASS=45531]
8	9	Homo sapiens (Human) PROTEIN PHOSPHATASE 2C ISOFORM GAMMA. [MASS=59272]
8	24	Homo sapiens (Human) HYPOTHETICAL PROTEIN LOC345651. [MASS=42003]
8	9	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 3. [MASS=60978]
8	10	Homo sapiens (Human) ISOFORM 1 OF EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 9. [MASS=92492]
8	9	Homo sapiens (Human) 60S ACIDIC RIBOSOMAL PROTEIN P0. [MASS=34274]
8	8	Homo sapiens (Human) FACT COMPLEX SUBUNIT SSRP1. [MASS=81075]
8	12	Homo sapiens (Human) NUCLEOSOME ASSEMBLY PROTEIN 1-LIKE 4. [MASS=43011]
8	12	Homo sapiens (Human) ISOFORM BETA-2 OF DNA TOPOISOMERASE 2-BETA. [MASS=183267]
8	9	Homo sapiens (Human) GARS PROTEIN. [MASS=84648]
8	8	Homo sapiens (Human) STRUCTURAL MAINTENANCE OF CHROMOSOME 1-LIKE 1 PROTEIN. [MASS=143233]
8	8	Homo sapiens (Human) DNA-DIRECTED RNA POLYMERASE II 140 KDA POLYPEPTIDE. [MASS=133897]
8	24	Homo sapiens (Human) NESTIN. [MASS=177439]
8	8	Homo sapiens (Human) PREDICTED: SIMILAR TO PEPTIDYLPROLYL ISOMERASE A ISOFORM 1. [MASS=24517]
8	11	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN D-LIKE. [MASS=46438]
8	10	Homo sapiens (Human) ISOFORM 2C OF CYTOPLASMIC DYNEIN 1 INTERMEDIATE CHAIN 2. [MASS=68426]
7	7	Homo sapiens (Human) CSNK2A1 PROTEIN. [MASS=45909]
7	7	Homo sapiens (Human) PEROXIREDOXIN-6. [MASS=24904]
7	9	Homo sapiens (Human) HIGH MOBILITY GROUP PROTEIN 1-LIKE 10. [MASS=24218]
7	10	Homo sapiens (Human) CALMODULIN. [MASS=16706]
7	9	Homo sapiens (Human) NUCLEOSOME ASSEMBLY PROTEIN 1-LIKE 1. [MASS=45374]
7	10	Homo sapiens (Human) IMPORTIN-9. [MASS=115832]
7	13	Homo sapiens (Human) ISOFORM 1 OF PROTEIN SET. [MASS=33489]
7	11	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN H1. [MASS=49229]
7	9	Homo sapiens (Human) SEPTIN-2. [MASS=41487]

Protein matches for CS19 human CSF		Total number of peptides
7	Homo sapiens (Human) ATAXIN-10. [MASS=53489]	7
7	Homo sapiens (Human) COATOMER SUBUNIT BETA. [MASS=107139]	7
7	Homo sapiens (Human) ISOFORM 2 OF DNA REPLICATION LICENSING FACTOR MCM7. [MASS=44649]	9
7	Homo sapiens (Human) IRON-RESPONSIVE ELEMENT-BINDING PROTEIN 1. [MASS=98399]	7
7	Homo sapiens (Human) TYROSINE 3-MONOOXYGENASE/TRYPTOPHAN 5-MONOOXYGENASE ACTIVATION PROTEIN, BETA POLYPEPTIDE. [MASS=28082]	10
7	Homo sapiens (Human) 26S PROTEASE REGULATORY SUBUNIT S10B. [MASS=44173]	9
7	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP781K0743. [MASS=105850]	8
7	Homo sapiens (Human) UBIQUITIN CARBOXYL-TERMINAL HYDROLASE ISOZYME L1. [MASS=24824]	8
7	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN U-LIKE PROTEIN 1. [MASS=95739]	9
7	Homo sapiens (Human) TUBULIN-TYROSINE LIGASE-LIKE PROTEIN 12. [MASS=74404]	8
7	Homo sapiens (Human) ISOFORM 2 OF NUCLEAR MITOTIC APPARATUS PROTEIN 1. [MASS=236531]	7
7	Homo sapiens (Human) ALPHA ISOFORM OF REGULATORY SUBUNIT A, PROTEIN PHOSPHATASE 2. [MASS=65309]	8
7	Homo sapiens (Human) ISOFORM 4 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A/B. [MASS=31233]	8
7	Homo sapiens (Human) CCR4-NOT TRANSCRIPTION COMPLEX, SUBUNIT 1 ISOFORM A. [MASS=266939]	8
7	Homo sapiens (Human) PROFILIN-1. [MASS=14923]	8
7	Homo sapiens (Human) PROLIFERATING CELL NUCLEAR ANTIGEN. [MASS=28769]	11
7	Homo sapiens (Human) METHIONYL-TRNA SYNTHETASE. [MASS=101116]	7
7	Homo sapiens (Human) UBIQUITIN-LIKE 1-ACTIVATING ENZYME E1A. [MASS=38450]	8
7	Homo sapiens (Human) ALCOHOL DEHYDROGENASE. [MASS=36442]	8
7	Homo sapiens (Human) ADP-RIBOSYLATION FACTOR 1. [MASS=20566]	7
7	Homo sapiens (Human) THIOREDOXIN-LIKE PROTEIN 1. [MASS=32120]	9
7	Homo sapiens (Human) ISOFORM 1 OF 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 1. [MASS=105836]	11
7	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 8. [MASS=105344]	7
7	Homo sapiens (Human) VESICLE-FUSING ATPASE. [MASS=82654]	7
7	Homo sapiens (Human) Complement component 3 precursor. [MASS=187306]	7
7	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 6. [MASS=52221]	7
7	Homo sapiens (Human) ATP-DEPENDENT DNA HELICASE 2 SUBUNIT 1. [MASS=69712]	8
7	Homo sapiens (Human) ISOFORM 1 OF HOST CELL FACTOR. [MASS=208842]	7

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
7	7	Homo sapiens (Human) METASTASIS-ASSOCIATED PROTEIN MTA2. [MASS=75023]
7	7	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN L ISOFORM A. [MASS=64133]
7	8	Homo sapiens (Human) 26S PROTEASE REGULATORY SUBUNIT 4. [MASS=49185]
7	8	Homo sapiens (Human) UDP-GLUCOSE CERAMIDE GLUCOSYLTRANSFERASE-LIKE 1 ISOFORM 1. [MASS=177190]
7	7	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 5B. [MASS=138800]
7	7	Homo sapiens (Human) ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR. [MASS=372820]
7	26	Homo sapiens (Human) TUBULIN BETA-1 CHAIN. [MASS=50327]
7	7	Homo sapiens (Human) ISOFORM 1 OF FILAMIN-B. [MASS=278195]
7	7	Homo sapiens (Human) CONTACTIN-2 PRECURSOR. [MASS=113393]
7	7	Homo sapiens (Human) UBIQUITIN SPECIFIC PROTEASE 9, X-LINKED ISOFORM 4. [MASS=290497]
6	11	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A3. [MASS=39595]
6	11	Homo sapiens (Human) HEMOGLOBIN SUBUNIT ALPHA. [MASS=15126]
6	8	Homo sapiens (Human) ASTROCYTIC PHOSPHOPROTEIN PEA-15. [MASS=15040]
6	6	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 7. [MASS=37025]
6	7	Homo sapiens (Human) PROTEASOME SUBUNIT BETA TYPE 1. [MASS=26489]
6	6	Homo sapiens (Human) ALPHA-CENTRACTIN. [MASS=42614]
6	10	Homo sapiens (Human) ISOFORM 1 OF PLASMINOGEN ACTIVATOR INHIBITOR 1 RNA-BINDING PROTEIN. [MASS=44965]
6	7	Homo sapiens (Human) CALPONIN-3. [MASS=36414]
6	7	Homo sapiens (Human) PROTEASOME SUBUNIT ALPHA TYPE 2. [MASS=25767]
6	8	Homo sapiens (Human) PHOSPHATIDYLETHANOLAMINE-BINDING PROTEIN 1. [MASS=20926]
6	6	Homo sapiens (Human) METHIONINE ADENOSYLTRANSFERASE II, BETA ISOFORM 1. [MASS=37552]
6	12	Homo sapiens (Human) VITRONECTIN PRECURSOR. [MASS=54306]
6	7	Homo sapiens (Human) PHOSPHORIBOSYL PYROPHOSPHATE SYNTHETASE-ASSOCIATED PROTEIN 2. [MASS=40926]
6	6	Homo sapiens (Human) CONDENSIN COMPLEX SUBUNIT 3. [MASS=114334]
6	10	Homo sapiens (Human) PEROXIREDOXIN-2. [MASS=21761]
6	12	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A1 ISOFORM B. [MASS=38747]
6	8	Homo sapiens (Human) RHO GDP-DISSOCIATION INHIBITOR 1. [MASS=23076]
6	6	Homo sapiens (Human) ISOFORM 1 OF DIPEPTIDYL-PEPTIDASE 3. [MASS=82589]
6	6	Homo sapiens (Human) ISOFORM 1 OF ACTIN-LIKE PROTEIN 6A. [MASS=47461]
6	6	Homo sapiens (Human) ISOFORM 2 OF NSFL1 COFACTOR P47. [MASS=37325]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
6	6	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 4 GAMMA, 1 ISOFORM 2. [MASS=166589]
6	53	Homo sapiens (Human) ELONGATION FACTOR 1-ALPHA 2. [MASS=50470]
6	8	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP664E242. [MASS=31424]
6	6	Homo sapiens (Human) 3-MERCAPTOPYRUVATE SULFURTRANSFERASE. [MASS=33047]
6	7	Homo sapiens (Human) CLUSTERIN PRECURSOR. [MASS=52495]
6	6	Homo sapiens (Human) REPLICATION PROTEIN A 70 KDA DNA-BINDING SUBUNIT. [MASS=68138]
6	7	Homo sapiens (Human) DYNACTIN 2. [MASS=44820]
6	7	Homo sapiens (Human) THIOREDOXIN-LIKE PROTEIN 2. [MASS=37432]
6	6	Homo sapiens (Human) ISOFORM 2 OF CADHERIN-11 PRECURSOR. [MASS=76541]
6	9	Homo sapiens (Human) S-ADENOSYLMETHIONINE SYNTHETASE ISOFORM TYPE-2. [MASS=43661]
6	7	Homo sapiens (Human) ISOFORM 1 OF ELAV-LIKE PROTEIN 3. [MASS=39547]
6	6	Homo sapiens (Human) SIMILAR TO ANNEXIN A2 ISOFORM 1. [MASS=38659]
6	8	Homo sapiens (Human) ASPARTATE AMINOTRANSFERASE, CYTOPLASMIC. [MASS=46116]
6	7	Homo sapiens (Human) NUCLEAR MIGRATION PROTEIN NUDC. [MASS=38243]
6	7	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S19. [MASS=15929]
6	6	Homo sapiens (Human) RNA BINDING PROTEIN (FRAGMENT). [MASS=32550]
6	6	Homo sapiens (Human) ISOFORM 1 OF DNA. [MASS=189566]
6	9	Homo sapiens (Human) ISOFORM 2 OF SERINE/THREONINE-PROTEIN KINASE DCAMKL1. [MASS=82224]
6	6	Homo sapiens (Human) PROTEIN TRANSPORT PROTEIN SEC23A. [MASS=86147]
6	10	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L4. [MASS=47566]
6	7	Homo sapiens (Human) PROTEASOME 26S NON-ATPASE SUBUNIT 13 ISOFORM 2. [MASS=39871]
6	6	Homo sapiens (Human) ISOFORM 4 OF AFADIN. [MASS=206804]
6	16	Homo sapiens (Human) DIHYDROXYRIMIDINASE-RELATED PROTEIN 2. [MASS=62294]
6	6	Homo sapiens (Human) WUGSC:H_RG054D04.1 PROTEIN. [MASS=29037]
6	7	Homo sapiens (Human) VACUOLAR ATP SYNTHASE CATALYTIC SUBUNIT A, UBIQUITOUS ISOFORM. [MASS=68304]
6	6	Homo sapiens (Human) MGEA5 PROTEIN. [MASS=95331]
6	7	Homo sapiens (Human) GLUCOSIDASE 2 SUBUNIT BETA PRECURSOR. [MASS=59296]
6	6	Homo sapiens (Human) CYSTEINYL-TRNA SYNTHETASE ISOFORM C. [MASS=94638]
6	9	Homo sapiens (Human) BIFUNCTIONAL PURINE BIOSYNTHESIS PROTEIN PURH. [MASS=64616]
6	6	Homo sapiens (Human) HSC70-INTERACTING PROTEIN. [MASS=41332]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
6	7	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S3. [MASS=26688]
6	9	Homo sapiens (Human) GALECTIN-3-BINDING PROTEIN PRECURSOR. [MASS=65331]
6	6	Homo sapiens (Human) ISOFORM 1 OF COMPLEMENT FACTOR B PRECURSOR (FRAGMENT). [MASS=85533]
6	6	Homo sapiens (Human) ISOFORM 1 OF POLYADENYLATE-BINDING PROTEIN 4. [MASS=70783]
6	6	Homo sapiens (Human) SPERMIDINE SYNTHASE. [MASS=33825]
6	7	Homo sapiens (Human) PROTEIN DJ-1. [MASS=19891]
6	8	Homo sapiens (Human) ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN H3. [MASS=36926]
6	8	Homo sapiens (Human) RAB1A, MEMBER RAS ONCOGENE FAMILY. [MASS=22678]
6	6	Homo sapiens (Human) WD40 PROTEIN. [MASS=35079]
6	11	Homo sapiens (Human) ISOFORM B1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEINS A2/B1. [MASS=37430]
6	7	Homo sapiens (Human) RUVB-LIKE 1. [MASS=50228]
6	10	Homo sapiens (Human) RNA BINDING MOTIF PROTEIN, X-LINKED-LIKE 1. [MASS=42142]
6	7	Homo sapiens (Human) PHOSPHOGLYCERATE MUTASE 2. [MASS=28635]
6	7	Homo sapiens (Human) DNA POLYMERASE DELTA CATALYTIC SUBUNIT. [MASS=123631]
6	6	Homo sapiens (Human) SF3B3 PROTEIN. [MASS=30210]
6	6	Homo sapiens (Human) RETINOBLASTOMA-ASSOCIATED FACTOR 600. [MASS=185447]
5	35	TRYPSIN PRECURSOR (EC 3.4.21.4)>PIR1:TRPGTR trypsin (EC 3.4.21.4)
5	8	Homo sapiens (Human) TUBULIN BETA-4 CHAIN. [MASS=49586]
5	18	Homo sapiens (Human) PROTHYMOSIN ALPHA. [MASS=12203]
5	6	Homo sapiens (Human) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 14. [MASS=34577]
5	7	Homo sapiens (Human) GLYOXYLATE REDUCTASE/HYDROXYPYRUVATE REDUCTASE. [MASS=35668]
5	7	Homo sapiens (Human) DNA-(APURINIC OR APYRIMIDINIC SITE) LYASE. [MASS=35423]
5	6	Homo sapiens (Human) ISOFORM 2 OF GUANINE NUCLEOTIDE-BINDING PROTEIN G(i), ALPHA-2 SUBUNIT. [MASS=38473]
5	5	Homo sapiens (Human) ISOFORM 1 OF PROTEIN 4.1. [MASS=97017]
5	7	Homo sapiens (Human) ADP-SUGAR PYROPHOSPHATASE. [MASS=24328]
5	6	Homo sapiens (Human) HISTONE H2B TYPE 2-E. [MASS=13789]
5	10	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN F. [MASS=45672]
5	9	Homo sapiens (Human) PREDICTED: SIMILAR TO HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A3 ISOFORM 1. [MASS=31312]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
5	9	Homo sapiens (Human) NG,NG-DIMETHYLARGININE DIMETHYLAMINOHYDROLASE 2. [MASS=29644]
5	5	Homo sapiens (Human) SERYL-TRNA SYNTHETASE. [MASS=58646]
5	5	Homo sapiens (Human) NUCLEASE SENSITIVE ELEMENT-BINDING PROTEIN 1. [MASS=35793]
5	10	Homo sapiens (Human) ISOFORM 1 OF CLEAVAGE AND POLYADENYLATION SPECIFICITY FACTOR 6. [MASS=59210]
5	7	Homo sapiens (Human) POLY(RC)-BINDING PROTEIN 1. [MASS=37498]
5	7	Homo sapiens (Human) ISOFORM B OF FIBULIN-1 PRECURSOR. [MASS=77186]
5	5	Homo sapiens (Human) FK506-BINDING PROTEIN 3. [MASS=25177]
5	5	Homo sapiens (Human) CTTN PROTEIN. [MASS=70959]
5	14	Homo sapiens (Human) PREDICTED: SIMILAR TO HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A1. [MASS=32163]
5	5	Homo sapiens (Human) PRE-MRNA-SPLICING FACTOR 19. [MASS=55181]
5	7	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S15. [MASS=16909]
5	6	Homo sapiens (Human) GLUTAMINYL-TRNA SYNTHETASE. [MASS=87799]
5	5	Homo sapiens (Human) PROTEIN RCC2. [MASS=56085]
5	8	Homo sapiens (Human) DOUBLECORTEX; LISSENCEPHALY, X-LINKED. [MASS=49847]
5	5	Homo sapiens (Human) ISOFORM B OF MANNOSE-6-PHOSPHATE RECEPTOR-BINDING PROTEIN 1. [MASS=47047]
5	6	Homo sapiens (Human) COATOMER SUBUNIT BETA'. [MASS=102356]
5	7	Homo sapiens (Human) HEPATOMA-DERIVED GROWTH FACTOR. [MASS=26788]
5	7	Homo sapiens (Human) ELAV-LIKE PROTEIN 1. [MASS=36092]
5	5	Homo sapiens (Human) PP856. [MASS=43833]
5	7	Homo sapiens (Human) RAS-RELATED PROTEIN RAB-2A. [MASS=23546]
5	6	Homo sapiens (Human) ISOFORM 2 OF PROTEIN ENABLED HOMOLOG. [MASS=63924]
5	7	Homo sapiens (Human) ISOFORM 1 OF BETA-CATENIN. [MASS=85497]
5	5	Homo sapiens (Human) AP-2 COMPLEX SUBUNIT ALPHA-2. [MASS=104150]
5	20	Homo sapiens (Human) EEF1A1 PROTEIN. [MASS=47869]
5	7	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S17. [MASS=15419]
5	6	Homo sapiens (Human) 14-3-3 PROTEIN GAMMA. [MASS=28171]
5	5	Homo sapiens (Human) RAS-GTPASE-ACTIVATING PROTEIN-BINDING PROTEIN 1. [MASS=52164]
5	11	Homo sapiens (Human) POLY(RC)-BINDING PROTEIN 2 ISOFORM B. [MASS=38222]
5	5	Homo sapiens (Human) EXPORTIN-T. [MASS=109964]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
5	6	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 2C 1. [MASS=97214]
5	5	Homo sapiens (Human) PREDICTED: STRUCTURAL MAINTENANCE OF CHROMOSOMES FLEXIBLE HINGE DOMAIN CONTAINING 1. [MASS=220242]
5	13	Homo sapiens (Human) PREGNANCY ZONE PROTEIN PRECURSOR. [MASS=163836]
5	6	Homo sapiens (Human) ISOFORM 1 OF LIM AND SH3 DOMAIN PROTEIN 1. [MASS=29717]
5	16	Homo sapiens (Human) SIMILAR TO NESTIN. [MASS=175922]
5	5	Homo sapiens (Human) ISOFORM 1 OF FILAMIN-C. [MASS=291293]
5	6	Homo sapiens (Human) MICROTUBULE-ASSOCIATED PROTEIN RPIEB FAMILY MEMBER 1. [MASS=29868]
5	5	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S13. [MASS=17091]
5	5	Homo sapiens (Human) MITOGEN-ACTIVATED PROTEIN KINASE 1. [MASS=41259]
5	5	Homo sapiens (Human) UDP-GLUCOSE 6-DEHYDROGENASE. [MASS=55024]
5	9	Homo sapiens (Human) PROBABLE ATP-DEPENDENT RNA HELICASE DDX5. [MASS=69148]
5	5	Homo sapiens (Human) ISOFORM 1 OF SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 3. [MASS=124504]
5	5	Homo sapiens (Human) HSP90 CO-CHAPERONE CDC37. [MASS=44468]
5	8	Homo sapiens (Human) AMBP PROTEIN PRECURSOR. [MASS=38999]
5	5	Homo sapiens (Human) CGI-150 PROTEIN. [MASS=55012]
5	6	Homo sapiens (Human) PRE-MRNA-PROCESSING FACTOR 6 HOMOLOG. [MASS=106925]
5	5	Homo sapiens (Human) TAR DNA-BINDING PROTEIN 43. [MASS=44740]
5	6	Homo sapiens (Human) ISOFORM 1 OF KH DOMAIN-CONTAINING, RNA-BINDING, SIGNAL TRANSDUCTION- ASSOCIATED PROTEIN 1. [MASS=48227]
5	5	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP451P021. [MASS=117896]
5	7	Homo sapiens (Human) KH-TYPE SPLICING REGULATORY PROTEIN. [MASS=73115]
5	5	Homo sapiens (Human) ISOCITRATE DEHYDROGENASE [NADP], MITOCHONDRIAL PRECURSOR. [MASS=50909]
5	5	Homo sapiens (Human) 182 KDA TANKYRASE 1-BINDING PROTEIN. [MASS=181816]
5	5	Homo sapiens (Human) CONDENSIN COMPLEX SUBUNIT 1. [MASS=157169]
5	7	Homo sapiens (Human) ISOFORM 1 OF ACIDIC LEUCINE-RICH NUCLEAR PHOSPHOPROTEIN 32 FAMILY MEMBER B. [MASS=28788]
5	5	Homo sapiens (Human) SMALL NUCLEAR RIBONUCLEOPROTEIN SM D2. [MASS=13527]
5	5	Homo sapiens (Human) FUSE-BINDING PROTEIN-INTERACTING REPRESSOR ISOFORM A. [MASS=59875]
5	6	Homo sapiens (Human) COP9 SIGNALOSOME COMPLEX SUBUNIT 6. [MASS=36163]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
5	5	Homo sapiens (Human) ACETYL-COA CARBOXYLASE 1. [MASS=265040]
5	5	Homo sapiens (Human) ISOFORM 2 OF SUPPRESSOR OF G2 ALLELE OF SKP1 HOMOLOG. [MASS=37673]
5	5	Homo sapiens (Human) ISOFORM 5 OF DYNAMIN-1-LIKE PROTEIN. [MASS=79123]
5	5	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L5. [MASS=34231]
5	6	Homo sapiens (Human) PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN L13 ISOFORM 1. [MASS=24280]
5	5	Homo sapiens (Human) INOSINE-5'-MONOPHOSPHATE DEHYDROGENASE 2. [MASS=55805]
5	5	Homo sapiens (Human) ISOFORM 1 OF PHOSPHOSERINE AMINOTRANSFERASE. [MASS=40423]
5	9	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN C-LIKE 1. [MASS=32142]
5	6	Homo sapiens (Human) UBIQUITIN-CONJUGATING ENZYME E2 N. [MASS=17138]
5	5	Homo sapiens (Human) PROTEIN KINASE C-BINDING PROTEIN NELL2 PRECURSOR. [MASS=91346]
5	5	Homo sapiens (Human) ISOFORM 1 OF DYNAMIN-2. [MASS=98064]
5	5	Homo sapiens (Human) NEURONAL PROTEIN NP25. [MASS=24893]
5	5	Homo sapiens (Human) SMALL GLUTAMINE-RICH TETRATRIPEPTIDE REPEAT-CONTAINING PROTEIN A. [MASS=34063]
4	4	Homo sapiens (Human) PROLYL ENDOPEPTIDASE. [MASS=80764]
4	6	Homo sapiens (Human) 60S ACIDIC RIBOSOMAL PROTEIN P2. [MASS=11665]
4	4	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S7. [MASS=22127]
4	6	Homo sapiens (Human) ISOFORM 1 OF DNA-BINDING PROTEIN A. [MASS=40090]
4	6	Homo sapiens (Human) ISOFORM EWS-B OF RNA-BINDING PROTEIN EWS. [MASS=61217]
4	4	Homo sapiens (Human) THYMIDYLATE SYNTHASE. [MASS=31759]
4	5	Homo sapiens (Human) NASCENT POLYPEPTIDE-ASSOCIATED COMPLEX SUBUNIT ALPHA. [MASS=23384]
4	5	Homo sapiens (Human) HISTIDINE-RICH GLYCOPROTEIN PRECURSOR. [MASS=59578]
4	4	Homo sapiens (Human) ISOFORM 1 OF PROTEASOME SUBUNIT ALPHA TYPE 7. [MASS=27887]
4	4	Homo sapiens (Human) 1-PHOSPHATIDYLINOSITOL-4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA 1. [MASS=148532]
4	4	Homo sapiens (Human) SPLICEOSOME RNA HELICASE BAT1. [MASS=48991]
4	5	Homo sapiens (Human) PREDICTED: SIMILAR TO PHOSPHOGLYCERATE MUTASE 1 (PHOSPHOGLYCERATE MUTASE ISOZYME B) (PGAM-B) (BPG-DEPENDENT PGAM 1) ISOFORM 1. [MASS=28850]
4	4	Homo sapiens (Human) CRK-LIKE PROTEIN. [MASS=33777]
4	5	Homo sapiens (Human) RNA-BINDING PROTEIN MUSASHI HOMOLOG 1. [MASS=39125]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
4	4	Homo sapiens (Human) FLAP ENDONUCLEASE 1. [MASS=42593]
4	5	Homo sapiens (Human) ISOFORM C OF FIBULIN-1 PRECURSOR. [MASS=74462]
4	39	Homo sapiens (Human) TUBA6 PROTEIN. [MASS=37021]
4	5	Homo sapiens (Human) BA395L14.12. [MASS=28403]
4	4	Homo sapiens (Human) ISOFORM SHORT OF TATA-BINDING PROTEIN-ASSOCIATED FACTOR 2N. [MASS=61558]
4	5	Homo sapiens (Human) LUNG CANCER ONCOGENE 7. [MASS=37889]
4	4	Homo sapiens (Human) DNAJ HOMOLOG SUBFAMILY A MEMBER 1. [MASS=44868]
4	5	Homo sapiens (Human) CLASS III ALCOHOL DEHYDROGENASE 5 CHI SUBUNIT. [MASS=41601]
4	5	Homo sapiens (Human) DYNC1H1 PROTEIN. [MASS=22182]
4	4	Homo sapiens (Human) ISOFORM 2 OF SERINE/THREONINE-PROTEIN KINASE PAK 1. [MASS=61632]
4	5	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L21. [MASS=18434]
4	7	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN U ISOFORM A. [MASS=90584]
4	4	Homo sapiens (Human) HISTONE H4. [MASS=11236]
4	4	Homo sapiens (Human) SCC-112 PROTEIN. [MASS=150830]
4	4	Homo sapiens (Human) VW DOMAIN-BINDING PROTEIN 11. [MASS=69998]
4	5	Homo sapiens (Human) ISOFORM 2 OF PUTATIVE GTP-BINDING PROTEIN PTD004. [MASS=27584]
4	4	Homo sapiens (Human) PLATELET-ACTIVATING FACTOR ACETYLHYDROLASE, ISOFORM IB, ALPHA SUBUNIT. [MASS=46638]
4	4	Homo sapiens (Human) ISOFORM II OF UBIQUITIN-PROTEIN LIGASE E3A. [MASS=100646]
4	4	Homo sapiens (Human) BRAIN ACID SOLUBLE PROTEIN 1. [MASS=22562]
4	7	Homo sapiens (Human) ACTIN-LIKE PROTEIN 2. [MASS=44761]
4	5	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 5. [MASS=49223]
4	4	Homo sapiens (Human) 14-3-3 PROTEIN ETA. [MASS=28088]
4	4	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 2 SUBUNIT 1. [MASS=35981]
4	5	Homo sapiens (Human) ISOFORM DELTA-1 OF SERINE/THREONINE-PROTEIN PHOSPHATASE 2A 56 KDA REGULATORY SUBUNIT DELTA ISOFORM. [MASS=69992]
4	4	Homo sapiens (Human) UBIQUITIN CARBOXYL-TERMINAL HYDROLASE 10. [MASS=87692]
4	5	Homo sapiens (Human) PDCD6IP PROTEIN. [MASS=96818]
4	4	Homo sapiens (Human) PROTEIN FAM98B. [MASS=37191]
4	5	Homo sapiens (Human) ISOFORM 1 OF 40S RIBOSOMAL PROTEIN S24. [MASS=15423]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
4	5	Homo sapiens (Human) ADENYLOSUCCINATE SYNTHETASE ISOZYME 2. [MASS=50097]
4	4	Homo sapiens (Human) ISOFORM 1 OF MICROTUBULE-ASSOCIATED PROTEIN RPIEB FAMILY MEMBER 2. [MASS=37031]
4	4	Homo sapiens (Human) EXPORTIN-7. [MASS=123776]
4	4	Homo sapiens (Human) PHOSPHOLIPASE A-2-ACTIVATING PROTEIN. [MASS=87157]
4	6	Homo sapiens (Human) ISOFORM 1 OF PHOSPHOLIPID TRANSFER PROTEIN PRECURSOR. [MASS=54739]
4	4	Homo sapiens (Human) CERULOPLASMIN PRECURSOR. [MASS=122205]
4	5	Homo sapiens (Human) RAS-RELATED PROTEIN RAB-7. [MASS=23490]
4	7	Homo sapiens (Human) SERINE/THREONINE-PROTEIN PHOSPHATASE 2A CATALYTIC SUBUNIT ALPHA ISOFORM. [MASS=35594]
4	4	Homo sapiens (Human) ISOFORM 1 OF DOUBLE-STRAND BREAK REPAIR PROTEIN MRE11A. [MASS=80593]
4	6	Homo sapiens (Human) ADENYLATE KINASE ISOENZYME 1. [MASS=21635]
4	5	Homo sapiens (Human) GPI-ANCHORED PROTEIN P137. [MASS=72752]
4	6	Homo sapiens (Human) ALPHA-2-ANTIPLASMIN PRECURSOR. [MASS=55064]
4	5	Homo sapiens (Human) PLASMA RETINOL-BINDING PROTEIN PRECURSOR. [MASS=23010]
4	4	Homo sapiens (Human) ISOFORM 4 OF SAPS DOMAIN FAMILY MEMBER 3. [MASS=88952]
4	5	Homo sapiens (Human) AP-1 COMPLEX SUBUNIT MU-1. [MASS=48456]
4	4	Homo sapiens (Human) ALPHA-SOLUBLE NSF ATTACHMENT PROTEIN. [MASS=33247]
4	4	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 4 GAMMA, 1 ISOFORM 4. [MASS=154805]
4	4	Homo sapiens (Human) PROTEASOME SUBUNIT ALPHA TYPE 6. [MASS=27399]
4	4	Homo sapiens (Human) QUINONE OXIDOREDUCTASE. [MASS=35207]
4	4	Homo sapiens (Human) SPLICING FACTOR 3A SUBUNIT 3. [MASS=58849]
4	4	Homo sapiens (Human) GMP SYNTHASE. [MASS=76715]
4	4	Homo sapiens (Human) ISOFORM 2 OF NMDA RECEPTOR-REGULATED PROTEIN 1. [MASS=61602]
4	4	Homo sapiens (Human) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 2. [MASS=36502]
4	5	Homo sapiens (Human) PROTEIN C14ORF166. [MASS=28068]
4	7	Homo sapiens (Human) FARNESYL DIPHOSPHATE SYNTHASE. [MASS=48275]
4	5	Homo sapiens (Human) COATOMER SUBUNIT GAMMA-2. [MASS=97622]
4	4	Homo sapiens (Human) FIBRILLARIN. [MASS=33784]
4	4	Homo sapiens (Human) NUCLEAR CAP-BINDING PROTEIN SUBUNIT 1. [MASS=91839]
4	4	Homo sapiens (Human) PROTEASOME SUBUNIT BETA TYPE 4 PRECURSOR. [MASS=29192]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
4	4	Homo sapiens (Human) CALCIUM-BINDING PROTEIN 39. [MASS=39869]
4	4	Homo sapiens (Human) PHENYLALANYL-TRNA SYNTHETASE BETA CHAIN. [MASS=66130]
4	4	Homo sapiens (Human) PROTEIN FAM49B. [MASS=36748]
4	4	Homo sapiens (Human) 47 KDA HEAT SHOCK PROTEIN PRECURSOR. [MASS=46267]
4	5	Homo sapiens (Human) PEPTIDYLPROLYL ISOMERASE B PRECURSOR. [MASS=23743]
4	4	Homo sapiens (Human) ISOFORM 1 OF EXPORTIN-5. [MASS=136311]
4	4	Homo sapiens (Human) CADHERIN-2 PRECURSOR. [MASS=99851]
4	4	Homo sapiens (Human) ISOFORM 3 OF DREBRIN-LIKE PROTEIN. [MASS=49042]
4	5	Homo sapiens (Human) 16 KDA PROTEIN. [MASS=16122]
4	4	Homo sapiens (Human) PROBABLE ATP-DEPENDENT RNA HELICASE DDX23. [MASS=95647]
4	4	Homo sapiens (Human) CORONIN-1C. [MASS=53249]
4	4	Homo sapiens (Human) SIGNAL RECOGNITION PARTICLE 14 KDA PROTEIN. [MASS=14544]
4	4	Homo sapiens (Human) TROPOMYOSIN 1 ALPHA CHAIN ISOFORM 2. [MASS=32678]
4	4	Homo sapiens (Human) VON HIPPEL-LINDAU BINDING PROTEIN 1. [MASS=26535]
4	7	Homo sapiens (Human) ACETYL-COA ACETYLTRANSFERASE, CYTOSOLIC. [MASS=41351]
4	5	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L19. [MASS=23466]
4	8	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S2. [MASS=31324]
4	5	Homo sapiens (Human) ISOFORM 1 OF MELANOMA-ASSOCIATED ANTIGEN D2. [MASS=64954]
4	7	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L3. [MASS=45978]
4	18	Homo sapiens (Human) UBIQUITIN AND RIBOSOMAL PROTEIN S27A PRECURSOR. [MASS=17965]
4	4	Homo sapiens (Human) PREDICTED: SIMILAR TO RAN-SPECIFIC GTPASE-ACTIVATING PROTEIN. [MASS=35024]
4	5	Homo sapiens (Human) SEPTIN 9. [MASS=63633]
4	4	Homo sapiens (Human) SPERMATID PERINUCLEAR RNA-BINDING PROTEIN. [MASS=73765]
4	5	Homo sapiens (Human) PROBABLE ATP-DEPENDENT RNA HELICASE DDX46. [MASS=117461]
4	4	Homo sapiens (Human) RAS-RELATED PROTEIN RAB-14. [MASS=23766]
4	6	Homo sapiens (Human) MARCKS-RELATED PROTEIN. [MASS=19398]
4	4	Homo sapiens (Human) GCN1-LIKE PROTEIN 1. [MASS=292930]
4	4	Homo sapiens (Human) KINESIN LIGHT CHAIN 1 ISOFORM 2. [MASS=65310]
4	4	Homo sapiens (Human) ISOFORM 2 OF AT-RICH INTERACTIVE DOMAIN-CONTAINING PROTEIN 1A. [MASS=218335]
4	5	Homo sapiens (Human) TROPOMYOSIN 4. [MASS=28522]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
4	4	Homo sapiens (Human) EARLY ENDOSOME ANTIGEN 1. [MASS=162466]
4	6	Homo sapiens (Human) RETICULOCALBIN-1 PRECURSOR. [MASS=38890]
4	4	Homo sapiens (Human) ISOFORM 1 OF APOPTOSIS INHIBITOR 5. [MASS=57561]
4	4	Homo sapiens (Human) ISOFORM 1 OF FOCAL ADHESION KINASE 1. [MASS=119233]
4	7	Homo sapiens (Human) TUBULIN-SPECIFIC CHAPERONE B. [MASS=27326]
4	4	Homo sapiens (Human) HSPC121. [MASS=44423]
4	6	Homo sapiens (Human) SEPTIN-11. [MASS=49267]
4	6	Homo sapiens (Human) NEUROCAN CORE PROTEIN PRECURSOR. [MASS=142973]
4	4	Homo sapiens (Human) LYSYL-TRNA SYNTHETASE. [MASS=68048]
4	5	Homo sapiens (Human) 6-PHOSPHOGLUCONOLACTONASE. [MASS=27547]
4	7	Homo sapiens (Human) SPLICING FACTOR, ARGININE/SERINE-RICH 2. [MASS=25345]
4	4	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L7A. [MASS=29864]
4	6	Homo sapiens (Human) GUANINE NUCLEOTIDE-BINDING PROTEIN G(I)/G(S)/G(T) SUBUNIT BETA 2. [MASS=37200]
4	4	Homo sapiens (Human) ISOFORM LONG OF 60 KDA SS-A/RO RIBONUCLEOPROTEIN. [MASS=60671]
4	4	Homo sapiens (Human) SUPERKILLER VIRALICIDIC ACTIVITY 2-LIKE 2. [MASS=117805]
4	5	Homo sapiens (Human) ISOFORM LONG OF TRIFUNCTIONAL PURINE BIOSYNTHETIC PROTEIN ADENOSINE-3. [MASS=107767]
4	4	Homo sapiens (Human) HEPARIN COFACTOR 2 PRECURSOR. [MASS=60178]
4	5	Homo sapiens (Human) APOLIPOPROTEIN A-II PRECURSOR. [MASS=11175]
4	4	Homo sapiens (Human) MYOSIN-11. [MASS=227339]
4	7	Homo sapiens (Human) HISTONE H1.2. [MASS=21234]
4	8	Homo sapiens (Human) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN G. [MASS=42332]
4	5	Homo sapiens (Human) GLUCOSAMINE-6-PHOSPHATE ISOMERASE. [MASS=32669]
4	4	Homo sapiens (Human) DNA LIGASE 1. [MASS=101736]
4	4	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L18A. [MASS=20762]
4	5	Homo sapiens (Human) CLEAVAGE AND POLYADENYLATION SPECIFICITY FACTOR 73 KDA SUBUNIT. [MASS=77486]
3	3	Homo sapiens (Human) PROTEASOME ACTIVATOR COMPLEX SUBUNIT 1. [MASS=28723]
3	3	Homo sapiens (Human) ACYLAMINO-ACID-RELEASING ENZYME. [MASS=81225]
3	5	Homo sapiens (Human) 60 KDA HEAT SHOCK PROTEIN, MITOCHONDRIAL PRECURSOR. [MASS=61055]
3	3	Homo sapiens (Human) THO COMPLEX SUBUNIT 4. [MASS=27558]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	3	Homo sapiens (Human) SMALL NUCLEAR RIBONUCLEOPROTEIN SM D1. [MASS=13282]
3	3	Homo sapiens (Human) FRUCTOSE-BISPHOSPHATE ALDOLASE C. [MASS=39325]
3	14	Homo sapiens (Human) ALPHA-2-HS-GLYCOPROTEIN PRECURSOR. [MASS=39325]
3	4	Homo sapiens (Human) IMPORTIN ALPHA-4 SUBUNIT. [MASS=57887]
3	5	Homo sapiens (Human) GTP BINDING PROTEIN 1. [MASS=72454]
3	3	Homo sapiens (Human) ISOFORM 1 OF DAZ-ASSOCIATED PROTEIN 1. [MASS=43383]
3	3	Homo sapiens (Human) VACUOLAR PROTEIN SORTING 26A. [MASS=38170]
3	3	Homo sapiens (Human) CYTOPLASMIC FMR1 INTERACTING PROTEIN 1 ISOFORM A. [MASS=145182]
3	3	Homo sapiens (Human) ATP SYNTHASE SUBUNIT ALPHA, MITOCHONDRIAL PRECURSOR. [MASS=59751]
3	4	Homo sapiens (Human) ACONITATE HYDRATASE, MITOCHONDRIAL PRECURSOR. [MASS=85425]
3	6	Homo sapiens (Human) LUNG CANCER ONCOGENE 7. [MASS=37889]
3	4	Homo sapiens (Human) F-ACTIN CAPPING PROTEIN ALPHA-2 SUBUNIT. [MASS=32818]
3	4	Homo sapiens (Human) ISOFORM DUT-M OF DEOXYURIDINE 5'-TRIPHOSPHATE NUCLEOTIDOHYDROLASE, MITOCHONDRIAL PRECURSOR. [MASS=26706]
3	6	Homo sapiens (Human) ISOFORM 1 OF ALPHA-ADDUCIN. [MASS=80955]
3	3	Homo sapiens (Human) ISOFORM 1 OF PROTEIN PHOSPHATASE 1 REGULATORY SUBUNIT 7. [MASS=41564]
3	3	Homo sapiens (Human) BM-010. [MASS=36153]
3	3	Homo sapiens (Human) PROTEIN TYROSINE PHOSPHATASE, RECEPTOR-TYPE, ZETA1 PRECURSOR. [MASS=254587]
3	3	Homo sapiens (Human) ISOFORM 3 OF UDP-N-ACETYLGLUCOSAMINE-PEPTIDE N-ACETYLGLUCOSAMINYLTRANSFERASE 110 KDA SUBUNIT. [MASS=116925]
3	3	Homo sapiens (Human) HIV TAT SPECIFIC FACTOR 1. [MASS=85853]
3	4	Homo sapiens (Human) UV EXCISION REPAIR PROTEIN RAD23 HOMOLOG B. [MASS=43171]
3	3	Homo sapiens (Human) PNAS-125. [MASS=23755]
3	5	Homo sapiens (Human) IGV1-5 PROTEIN. [MASS=26234]
3	19	Homo sapiens (Human) HEMOGLOBIN SUBUNIT GAMMA-1. [MASS=16009]
3	3	Homo sapiens (Human) EXOSOME COMPLEX EXONUCLEASE RRP42. [MASS=31835]
3	3	Homo sapiens (Human) ISOFORM 2 OF TRANSCRIPTION FACTOR BTF3. [MASS=17699]
3	4	Homo sapiens (Human) HISTONE-BINDING PROTEIN RBBP4. [MASS=47525]
3	3	Homo sapiens (Human) SERINE/THREONINE-PROTEIN KINASE MRCK BETA. [MASS=194315]
3	3	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP686I0180 (FRAGMENT). [MASS=28810]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	4	Homo sapiens (Human) THYMOPOLYMERIN ISOFORM BETA. [MASS=50670]
3	3	Homo sapiens (Human) DNA-DIRECTED RNA POLYMERASE II LARGEST SUBUNIT. [MASS=217206]
3	5	Homo sapiens (Human) FACTOR VII ACTIVE SITE MUTANT IMMUNOCONJUGATE. [MASS=75553]
3	3	Homo sapiens (Human) TUBULIN-SPECIFIC CHAPERONE A. [MASS=12724]
3	3	Homo sapiens (Human) TRYPTOPHANYL-TRNA SYNTHETASE. [MASS=53165]
3	3	Homo sapiens (Human) ISOFORM 1 OF SYMPLEKIN. [MASS=141148]
3	3	Homo sapiens (Human) SERINE/THREONINE-PROTEIN PHOSPHATASE 4 CATALYTIC SUBUNIT. [MASS=35080]
3	3	Homo sapiens (Human) ANTITHROMBIN III VARIANT. [MASS=52692]
3	7	Homo sapiens (Human) UBIQUITIN-ACTIVATING ENZYME E1. [MASS=25052]
3	3	Homo sapiens (Human) PREDICTED: SIMILAR TO CHLORIDE INTRACELLULAR CHANNEL PROTEIN 4. [MASS=17863]
3	3	Homo sapiens (Human) ISOFORM 1 OF TRANSCRIPTION ELONGATION FACTOR SPT5. [MASS=121000]
3	4	Homo sapiens (Human) EUKARYOTIC INITIATION FACTOR 5A ISOFORM I VARIANT A. [MASS=20170]
3	3	Homo sapiens (Human) ISOFORM 3 OF DNA REPAIR PROTEIN RAD50. [MASS=138432]
3	3	Homo sapiens (Human) COP9 SIGNALOSOME COMPLEX SUBUNIT 5. [MASS=37448]
3	3	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP547J2313. [MASS=18829]
3	4	Homo sapiens (Human) CORTICOSTEROID-BINDING GLOBULIN PRECURSOR. [MASS=45141]
3	4	Homo sapiens (Human) PROFILIN 2 ISOFORM A. [MASS=15046]
3	4	Homo sapiens (Human) ISOFORM GAMMA-1 OF SERINE/THREONINE-PROTEIN PHOSPHATASE PP1-GAMMA CATALYTIC SUBUNIT. [MASS=36984]
3	4	Homo sapiens (Human) ISOFORM 1 OF UBIQUITIN-PROTEIN LIGASE BRE1B. [MASS=113678]
3	3	Homo sapiens (Human) ISOFORM 1 OF RAS GTPASE-ACTIVATING PROTEIN 1. [MASS=116403]
3	5	Homo sapiens (Human) ACTIN-RELATED PROTEIN 2/3 COMPLEX SUBUNIT 1A. [MASS=41569]
3	3	Homo sapiens (Human) CADHERIN-5 PRECURSOR. [MASS=87516]
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S14. [MASS=16142]
3	3	Homo sapiens (Human) LETHAL GIANT LARVAE HOMOLOG 1. [MASS=115388]
3	3	Homo sapiens (Human) LEUCINE ZIPPER TRANSCRIPTION FACTOR-LIKE 1. [MASS=34592]
3	4	Homo sapiens (Human) MEPRIN A SUBUNIT ALPHA PRECURSOR. [MASS=84368]
3	4	Homo sapiens (Human) WD REPEAT PROTEIN 61. [MASS=33581]
3	3	Homo sapiens (Human) TRIPARTITE MOTIF-CONTAINING PROTEIN 2. [MASS=81530]
3	4	Homo sapiens (Human) ISOFORM 1 OF ATP-DEPENDENT RNA HELICASE DDX19B. [MASS=53927]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	3	Homo sapiens (Human) SORTING NEXIN 1 ISOFORM C. [MASS=53304]
3	3	Homo sapiens (Human) HISTONE ACETYLTRANSFERASE TYPE B CATALYTIC SUBUNIT. [MASS=49513]
3	3	Homo sapiens (Human) SWI/SNF-RELATED MATRIX-ASSOCIATED ACTIN-DEPENDENT REGULATOR OF CHROMATIN SUBFAMILY A MEMBER 5. [MASS=121905]
3	3	Homo sapiens (Human) HEAT SHOCK 70 KDA PROTEIN 4L. [MASS=94486]
3	4	Homo sapiens (Human) AFLATOXIN B1 ALDEHYDE REDUCTASE MEMBER 2. [MASS=39589]
3	4	Homo sapiens (Human) D-DOPACHROME DECARBOXYLASE. [MASS=12581]
3	3	Homo sapiens (Human) THIMET OLIGOPEPTIDASE. [MASS=78709]
3	3	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L38. [MASS=8087]
3	3	Homo sapiens (Human) ALDEHYDE DEHYDROGENASE 16 FAMILY, MEMBER A1. [MASS=85127]
3	3	Homo sapiens (Human) CYTOCHROME B5 REDUCTASE ISOFORM 1. [MASS=34235]
3	3	Homo sapiens (Human) NETRIN RECEPTOR DCC PRECURSOR. [MASS=158457]
3	4	Homo sapiens (Human) ISOPENTENYL-DIPHOSPHATE DELTA ISOMERASE. [MASS=32485]
3	4	Homo sapiens (Human) PHOSPHATIDYLINOSITOL TRANSFER PROTEIN, BETA. [MASS=31540]
3	3	Homo sapiens (Human) HIGH MOBILITY GROUP PROTEIN B2. [MASS=23903]
3	5	Homo sapiens (Human) TUMOR PROTEIN, TRANSLATIONALLY-CONTROLLED 1. [MASS=21526]
3	3	Homo sapiens (Human) BLEOMYCIN HYDROLASE. [MASS=52562]
3	9	Homo sapiens (Human) ALPHA-ENOLASE, LUNG SPECIFIC. [MASS=49477]
3	4	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L12. [MASS=17819]
3	3	Homo sapiens (Human) CELL DIVISION CYCLE 5-LIKE PROTEIN. [MASS=92251]
3	3	Homo sapiens (Human) ISOFORM 2 OF UBIQUITIN CARBOXYL-TERMINAL HYDROLASE 47. [MASS=147180]
3	3	Homo sapiens (Human) COMPLEMENT C5 PRECURSOR. [MASS=188331]
3	3	Homo sapiens (Human) ISOFORM 1 OF CYTOPLASMIC LINKER PROTEIN 2. [MASS=115837]
3	3	Homo sapiens (Human) THIOREDOXIN REDUCTASE 1, CYTOPLASMIC PRECURSOR. [MASS=54707]
3	4	Homo sapiens (Human) HISTONE H1X. [MASS=22487]
3	3	Homo sapiens (Human) ISOFORM GTBP-N OF DNA MISMATCH REPAIR PROTEIN MSH6. [MASS=152786]
3	3	Homo sapiens (Human) BILIVERDIN REDUCTASE A PRECURSOR. [MASS=33428]
3	3	Homo sapiens (Human) LAMINA-ASSOCIATED POLYPEPTIDE 2 ISOFORM ALPHA. [MASS=75361]
3	3	Homo sapiens (Human) SYNAPTIC VESICLE MEMBRANE PROTEIN VAT-1 HOMOLOG. [MASS=41920]
3	3	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L8. [MASS=27893]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	3	Homo sapiens (Human) PHYTANOYL-COA HYDROXYLASE INTERACTING PROTEIN-LIKE. [MASS=42486]
3	3	Homo sapiens (Human) CONDENSIN COMPLEX SUBUNIT 2. [MASS=82535]
3	3	Homo sapiens (Human) HIGH-MOBILITY GROUP BOX 1. [MASS=15185]
3	3	Homo sapiens (Human) SELENIDE, WATER DIKINASE 1. [MASS=42911]
3	5	Homo sapiens (Human) APOLIPOPROTEIN M. [MASS=21253]
3	3	Homo sapiens (Human) HYPOTHETICAL PROTEIN DKFZP686M09245. [MASS=61598]
3	3	Homo sapiens (Human) ISOFORM 1 OF EXOSOME COMPLEX EXONUCLEASE RRP44. [MASS=109003]
3	3	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L10A. [MASS=24700]
3	3	Homo sapiens (Human) ECHINODERM MICROTUBULE-ASSOCIATED PROTEIN-LIKE 4. [MASS=108903]
3	3	Homo sapiens (Human) CALPAIN-1 CATALYTIC SUBUNIT. [MASS=81890]
3	4	Homo sapiens (Human) 55 KDA PROTEIN. [MASS=55183]
3	3	Homo sapiens (Human) ZYXIN. [MASS=67285]
3	5	Homo sapiens (Human) DEVELOPMENTALLY-REGULATED GTP-BINDING PROTEIN 1. [MASS=40542]
3	3	Homo sapiens (Human) TYROSYL-TRNA SYNTHETASE, CYTOPLASMIC. [MASS=59012]
3	3	Homo sapiens (Human) PEROXISOMAL MULTIFUNCTIONAL ENZYME TYPE 2. [MASS=79555]
3	3	Homo sapiens (Human) U4/U6.U5 TRI-SNRNP-ASSOCIATED PROTEIN 1. [MASS=90255]
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S21. [MASS=9111]
3	3	Homo sapiens (Human) DNAJ HOMOLOG SUBFAMILY C MEMBER 7. [MASS=56441]
3	4	Homo sapiens (Human) CALSYNTENIN 1 ISOFORM 2. [MASS=108643]
3	3	Homo sapiens (Human) TWINFILIN ISOFORM 1. [MASS=43918]
3	3	Homo sapiens (Human) CENTROSOMAL PROTEIN 170KDA ISOFORM ALPHA. [MASS=175436]
3	3	Homo sapiens (Human) ISOFORM 1 OF 26S PROTEASE REGULATORY SUBUNIT 6B. [MASS=47366]
3	4	Homo sapiens (Human) U1 SMALL NUCLEAR RIBONUCLEOPROTEIN A. [MASS=31148]
3	4	Homo sapiens (Human) PEPTIDYL-PROLYL CIS-TRANS ISOMERASE A. [MASS=17881]
3	3	Homo sapiens (Human) PEROXISOMAL MULTIFUNCTIONAL ENZYME TYPE 2. [MASS=79555]
3	3	Homo sapiens (Human) RAS-RELATED PROTEIN RAB-5C. [MASS=23483]
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S8. [MASS=24074]
3	6	Homo sapiens (Human) PERIPHERIN. [MASS=53878]
3	3	Homo sapiens (Human) NUCLEOSIDE DIPHOSPHATE KINASE B. [MASS=17298]
3	5	Homo sapiens (Human) SEC31L1 PROTEIN. [MASS=121651]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S16. [MASS=16314]
3	3	Homo sapiens (Human) UROPORPHYRINOGEN DECARBOXYLASE. [MASS=40787]
3	3	Homo sapiens (Human) 114 KDA PROTEIN. [MASS=113977]
3	4	Homo sapiens (Human) COLLAGEN ALPHA-1(V) CHAIN PRECURSOR. [MASS=183560]
3	3	Homo sapiens (Human) CYTOPLASMIC DYNEIN 1 LIGHT INTERMEDIATE CHAIN 2. [MASS=54099]
3	3	Homo sapiens (Human) CYTOSOLIC AMINOPEPTIDASE P. [MASS=74798]
3	3	Homo sapiens (Human) ISOFORM 2 OF SPLICING FACTOR 1. [MASS=68502]
3	3	Homo sapiens (Human) PREDICTED: SIMILAR TO BASIC LEUCINE ZIPPER AND W2 DOMAINS 1. [MASS=34090]
3	3	Homo sapiens (Human) ISOFORM 1 OF URIDINE 5'-MONOPHOSPHATE SYNTHASE. [MASS=52222]
3	3	Homo sapiens (Human) DEAD BOX POLYPEPTIDE 42 PROTEIN. [MASS=102975]
3	4	Homo sapiens (Human) ISOFORM C OF NEURAL CELL ADHESION MOLECULE 1, 120 KDA ISOFORM PRECURSOR. [MASS=83985]
3	3	Homo sapiens (Human) COLD-INDUCIBLE RNA-BINDING PROTEIN. [MASS=18648]
3	4	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L18. [MASS=21503]
3	3	Homo sapiens (Human) ISOFORM 1 OF JMJC DOMAIN-CONTAINING HISTONE DEMETHYLATION PROTEIN 2B. [MASS=191611]
3	3	Homo sapiens (Human) RCC1 PROTEIN. [MASS=48146]
3	3	Homo sapiens (Human) LEUCINE-RICH REPEAT-CONTAINING PROTEIN 47. [MASS=63473]
3	3	Homo sapiens (Human) ISOFORM 1 OF RNA-BINDING PROTEIN NOVA-1. [MASS=52056]
3	6	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S10. [MASS=18898]
3	3	Homo sapiens (Human) SPLICING FACTOR U2AF 65 KDA SUBUNIT. [MASS=53501]
3	3	Homo sapiens (Human) ISOFORM SHORT OF PROTEASOME SUBUNIT ALPHA TYPE 1. [MASS=29556]
3	3	Homo sapiens (Human) ALPHA-1-ACID GLYCOPROTEIN 2 PRECURSOR. [MASS=23603]
3	4	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S23. [MASS=15676]
3	3	Homo sapiens (Human) DOLICHYL-DIPHOSPHOOLIGOSACCHARIDE--PROTEIN GLYCOSYLTRANSFERASE 67 KDA SUBUNIT PRECURSOR. [MASS=72778]
3	3	Homo sapiens (Human) HYPOTHETICAL PROTEIN LOC387104. [MASS=103199]
3	3	Homo sapiens (Human) PROTEIN TRANSPORT PROTEIN SEC24C. [MASS=118315]
3	4	Homo sapiens (Human) THIOREDOXIN. [MASS=11606]
3	3	Homo sapiens (Human) CYTOSOLIC PURINE 5'-NUCLEOTIDASE. [MASS=64970]

Protein matches for CS19 human CSF		
Number of unique peptides from protein	Total number of peptides	
3	6	Homo sapiens (Human) PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN S3A ISOFORM 1. [MASS=24821]
3	4	Homo sapiens (Human) ACIDIC LEUCINE-RICH NUCLEAR PHOSPHOPROTEIN 32 FAMILY MEMBER A. [MASS=28585]
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S25. [MASS=13742]
3	3	Homo sapiens (Human) ADP-RIBOSYLATION FACTOR-LIKE PROTEIN 3. [MASS=20456]
3	4	Homo sapiens (Human) CYSTATIN B. [MASS=11140]
3	3	Homo sapiens (Human) PHOSPHOGLUCOMUTASE-2-LIKE 1. [MASS=70456]
3	3	Homo sapiens (Human) 40S RIBOSOMAL PROTEIN S9. [MASS=22460]
3	3	Homo sapiens (Human) ANKYRIN REPEAT AND FYVE DOMAIN CONTAINING 1 ISOFORM 1. [MASS=128486]
3	3	Homo sapiens (Human) ISOFORM LONG OF COLD SHOCK DOMAIN-CONTAINING PROTEIN E1. [MASS=88885]
3	3	Homo sapiens (Human) DEAD (ASP-GLU-ALA-ASP) BOX POLYPEPTIDE 39, ISOFORM 2. [MASS=35095]
3	3	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L23A. [MASS=17695]
3	4	Homo sapiens (Human) ALPHA-INTERNEXIN. [MASS=55391]
3	3	Homo sapiens (Human) ISOFORM 3 OF ANAMORSIN. [MASS=32213]
3	3	Homo sapiens (Human) SPLICING FACTOR, ARGININE/SERINE-RICH 4. [MASS=56678]
3	3	Homo sapiens (Human) DEBRANCHING ENZYME HOMOLOG 1. [MASS=61555]
3	3	Homo sapiens (Human) ISOFORM 2 OF PROTEASOME SUBUNIT ALPHA TYPE 3. [MASS=27516]
3	3	Homo sapiens (Human) MICROSOMAL TRIGLYCERIDE TRANSFER PROTEIN LARGE SUBUNIT PRECURSOR. [MASS=99351]
3	4	Homo sapiens (Human) ISOFORM B OF NEURONAL-SPECIFIC SEPTIN-3. [MASS=40100]
3	4	Homo sapiens (Human) 60S RIBOSOMAL PROTEIN L28. [MASS=15616]
3	6	Homo sapiens (Human) PREDICTED: SIMILAR TO HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN K ISOFORM A ISOFORM 2. [MASS=24258]

PATENT**ATTORNEY DOCKET NO. 01948/144WO2****Characterization of the rat embryonic proteome**

CSF was collected from the lateral ventricle of E12.5, E14.5, and E17.5 rat embryos and from the fourth ventricle of E14.5 rat embryos. CSF from two litters (approximately 20-24 rat embryos) was pooled for each time point and was separated by 1-D SDS-PAGE and the proteins were visualized with Coomassie blue stain. Figure 1C shows the Coomassie stained protein pattern of CSF collected from all three time-points. Mass spectrometry analysis of the rat CSF was performed separately for E12.5, E14.5, E17.5 lateral ventricle, and E14.5 fourth ventricle and presented as Supplementary information table 4. There were 423 proteins identified in E12.5 LV CSF, 318 proteins in E14.5 LV, 249 proteins in E14.5 4thV, and 382 proteins in E17.5 LV. There are 137 proteins common to E12.5, E14.5, and E17.5 rat CSF samples that are presented in Table 3, which includes the name of the protein, its molecular weight, subcellular localization, function, tissue specificity. Also included are relevant notes about each protein. Interestingly, there are 61 proteins identified in E12.5 LV, E14.5 LV, and E17.5 LV that were not identified in E14.5 4thV and only 5 proteins identified in E12.5 LV, E14.5 4thV, and E17.5 LV that were not identified in E14.5 LV. This does not appear to be simply due to an overall reduction in E14.5 4thV protein concentration as similar numbers of peptides were identified for the proteins found in common with LV CSF samples. Instead, the difference suggests potential differences in the protein composition of CSF between the lateral and fourth ventricles, though further studies would be needed to confirm this and to assess its significance.

Table 3. Common proteins from mass spectrometry analysis of embryonic rat CSF isolated from E12.5 LV, E14.5 LV and 4th V, and E17.5 LV. The number of peptides is listed from E14.5 4th V.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
120	617	Q7TMA5	AA1064 - apolipoprotein B	536024	Secreted	Lipid and fatty acid transport and metabolism	Plasma	Apo B-100 functions as a recognition signal for the cellular binding and internalization of LDL particles by the apoB/E receptor
66	382	Q4G047	Apolipoprotein B - fragment	165356	Secreted	Lipid and fatty acid transport and metabolism	Plasma	Fragment molecule
37	135	P04937	SPLICE ISOFORM 1 OF FIBRONECTIN PRECURSOR	272511	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Plasma fibronectin made by liver and cellular fibronectin made by fibroblasts, epithelial and other cell types is deposited in the extracellular matrix	Integrin signaling pathway
34	365	P02773	SPLICE ISOFORM 1 OF ALPHA-FETOPROTEIN PRECURSOR	68386	Secreted	Transport/Transfer-Carrier	Plasma	Binds copper, nickel, and fatty acids as well as, and bilirubin less well than, serum albumin.
31	120	P02651	APOLIPOPROTEIN A-IV PRECURSOR	44456	Secreted	Lipid and fatty acid transport and metabolism	Plasma	May have a role in chylomicrons and VLDL secretion and catabolism. ApoA-IV is a major component of HDL and chylomicrons.
28	53	P06238	ALPHA-2-MACROGLOBULIN PRECURSOR	163701	Secreted	Serine Protease Inhibitor	Plasma	Plays role in acute phase response

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
21	26	Q9JL97	GPI-ANCHORED CERULOPLASMIN	123749	Cell Membrane	Transport, Transfer/Carrier, Oxidoreductase	Brain	Metal ion binding oxidoreductase activity ion transport
21	35	P14046	ALPHA-1-INHIBITOR 3 PRECURSOR	163773	Secreted	Serine Protease Inhibitor	Plasma	Belongs to the alpha-2-macroglobulin family involved in inflammatory response
20	96	Q7TP24	BA1-667 - Transferrin	107448	Secreted	Transport, Transfer/Carrier	Plasma	Iron ion homeostasis, iron ion transport
19	30	P22063	CONTACTIN-2 PRECURSOR	113043	Cell Membrane	Cell Adhesion - Neurogenesis	In neural tissues in embryos, and in adult brain, spinal cord and cerebellum.	May play a role in the initial growth and guidance of axons. Belongs to the immunoglobulin superfamily.
18	79	P04639	APOLIPOPROTEIN A-I PRECURSOR	30088	Secreted	Lipid and fatty acid transport and metabolism	Major protein of plasma HDL, also found in chylomicrons.	Participates in the reverse transport of cholesterol from tissues to the liver for excretion by promoting cholesterol efflux from tissues and by acting as a cofactor for the lecithin cholesterol acyltransferase (LCAT).
18	97	P02770	SERUM ALBUMIN PRECURSOR	68719	Secreted	Transport, Transfer/Carrier	Plasma.	The main protein of plasma, has a good binding capacity for water, Ca(2+), Na(+), K(+), fatty acids, hormones, bilirubin and drugs. Its main function is the regulation of the colloidal osmotic pressure of blood.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
18	33	P08460	PREDICTED: NIDOGEN	138365	Secreted, extracellular space, extracellular matrix	Cell - extracellular matrix adhesion	Wide distribution	Found in basement membranes often associated with laminin.
15	34	P17475	ALPHA-1-ANTIPROTEINASE PRECURSOR	46136	Secreted	Serine Protease Inhibitor	Plasma	Blood coagulation. The primary target is elastase, but also has a moderate affinity for plasmin and thrombin.
15	17	Q7TP05	DA1-24 - Complement Factor B	124379	Secreted	<u>Serine Protease - Complement Mediated Immunity</u>	Plasma	Hydrolase, Peptidase
14	23	GeneID:307618	PREDICTED: SIMILAR TO CADHERIN-5	135230	Cell junction, cell membrane	Cell Adhesion	Endothelial tissues and brain	Cell - Cell interactions and junctions
13	20	Q80ZA3	ALPHA-2 ANTIPLASMIN	46465	Secreted	Serine Protease Inhibitor	Plasma	Blood coagulation
13	18	P25304	SPICE ISOFORM 1 OF AGRIN PRECURSOR	208646	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Embryonic nervous system and muscle	Component of the basal lamina that binds to laminin.
13	25	GeneID:313641	PREDICTED: SIMILAR TO HEPARAN SULFATE PROTEOGLYCAN 2 (Perlecan)	377284	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Widely distributed	Integral component of basement membranes
13	19	O35802	INTER-ALPHA-INHIBITOR H4 HEAVY CHAIN	103755	Secreted	Serine Protease Inhibitor	Plasma	Involved in acute phase response
12	14	Q68FP1	GELSOLIN	86286	Secreted and Cytoplasm	Cell structure	Ubiquitous	Actin binding protein, may be involved in myelination
12	15	Q5M7T5	SERINE/CYSTEINE PROTEINASE INHIBITOR, CLADE C, MEMBER 1	52234	Secreted	Protease inhibitor with a wide spectrum of protein targets	Plasma	Belongs to the serpin family
12	22	P01026	COMPLEMENT C3 PRECURSOR	186460	Secreted	Complement mediated immunity	Plasma	Plays a central role in the activation of the complement system.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
12	24	P02650	APOLIPOPROTEIN E PRECURSOR	35763	Secreted	Lipid and fatty acid transport and metabolism	Plasma	Mediates the binding, internalization, and catabolism of lipoprotein particles
11	14	Q62917	LAR RECEPTOR-LINKED TYROSINE PHOSPHATASE	181130	Cell Membrane	Cell adhesion mediated signaling, cell structure and motility	Widely distributed	May play a role in neurite outgrowth.
11	12	Q63155	DELETED IN COLORECTAL CANCER	158142	Membrane - Intracellular	Ligand mediated signaling, cell adhesion	During development expressed highly in brain and neural tube	Netrin receptor activity, transcription coactivator activity, axon guidance, and apoptosis
11	12	NM_199093	SERINE PEPTIDASE INHIBITOR, CLADE G, MEMBER 1	55611	Secreted	Protease inhibitor	Plasma	Involved in the regulation of classical complement pathway
11	17	P31211	CORTICOSTEROID-BINDING GLOBULIN PRECURSOR	44672	Secreted	Transpos and Serine Protease inhibitor	Expressed by the liver, secreted in plasma.	Major transport protein for glucocorticoids and progestins in the blood
11	12	GeneID:298941	<u>PREDICTED: SIMILAR TO LAMININ B1</u>	228429	Secreted, extracellular space, extracellular matrix	Extracellular matrix linker protein-mediated signaling	Widely distributed in basement membranes	Is thought to mediate the attachment, migration and organization of cells into tissues during embryonic development by interacting with other extracellular matrix components.
11	11	P05197	<u>ELONGATION FACTOR 2</u>	95153	Cytoplasm - Intracellular	Protein biosynthesis - Translational elongation factor	Ubiquitous	Promotes translocation of protein chain from A site to P site on ribosome
11	14	P06399	SPLICE ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR	86686	Secreted	Blood clotting	Plasma	Monomers polymerize into fibrin and acts as a cofactor in platelet aggregation
10	21	Q9Z1Y3	NEURAL-CADHERIN PRECURSOR	99686	Cell Membrane	Cell adhesion	Testis and neurons	May be involved in neuronal tissue recognition

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
10	22	GeneID:315191	PREDICTED: SIMILAR TO FIBULIN-1 PRECURSOR	78072	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Detected in most organs (brain, heart, lung, spleen, liver and kidney). Neurons are the predominant source of production in the brain. Not expressed significantly by astrocytes or microglia.	Incorporated into fibronectin-containing matrix fibers. May play a role in cell adhesion and migration along protein fibers within the extracellular matrix (ECM). Could be important for certain developmental processes and contribute to the organization of ECM architecture, in particular to those of basement membranes.
10	11	Q64610	ECTONUCLEOTIDE PYROPHOSPHATASE/PHOSPHODIESTERASE 2	101310	Membrane	Hydrolase	Abundantly expressed in cerebrum and cerebellum. Localized in secretory epithelial cells in the brain and the eye including choroid plexus epithelial cells, ciliary epithelial cells, iris pigment epithelial cells, and retinal pigment cells.	Hydrolytically removes 5'-nucleotides successively from the 3'-hydroxy termini of 3'-hydroxy-terminated oligonucleotides
10	21	P02454	COLLAGEN ALPHA-1(I) CHAIN PRECURSOR	137886	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Forms the fibrils of tendon, ligaments and bones	Component of connective tissue

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
10	21	P51886	LUMICAN PRECURSOR	38279	Secreted, extracellular space, extracellular matrix	Cell adhesion mediated signaling	Widely distributed	Binds to laminin
9	51	P02767	TRANSTHYRETIN PRECURSOR	15720	Secreted	Hormone transport	Most abundant in the choroid plexus. Also present in the liver	Thyroid hormone-binding protein. Probably transports thyroxine from the bloodstream to the brain
9	13	P00787	CATHEPSIN B PRECURSOR	37470	Lysosome	Cysteine protease	Widely distributed	Participates in intracellular degradation and turnover of proteins. Has been implicated in tumor invasion and metastasis
9	13	Q03626	ALPHA(1)-INHIBITOR 3, VARIANT I PRECURSOR	165326	Secreted	Serine Protease Inhibitor	Serum	Involved in acute phase inflammatory response
9	11	GeneID:116669	<u>PREDICTED: VON WILLEBRAND FACTOR</u>	308474	Secreted, extracellular space, extracellular matrix	Cell adhesion - Blood clotting	Plasma	Major coagulation factor
9	18	Q5M7V3	LOC367586 PROTEIN - Immunoglobulin Gamma heavy Chain	50949	Cell Membrane	B-cell and antibody-mediated immunity	Plasma	Associates non-covalently with beta-2-microglobulin, antigen binding
8	10	Q91XW0	<u>HEAT SHOCK PROTEIN 86</u>	84815	Cytoplasm	Molecular chaperone, protein folding, stress response	Ubiquitous	
8	8	Q920H8	<u>HEPHAESTIN PRECURSOR</u>	129593	Membrane	Oxidase	Expressed highly in intestine, lung and brain	May function as a ferroxidase for ferrous (II) to ferric ion (III) conversion and in copper transport and homeostasis

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
8	13	P13941	COLLAGEN ALPHA-1(III) CHAIN PRECURSOR	138936	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Widely distributed, highly expressed in colon and blood vessels	Component of connective tissue
8	9	P58751	<u>SPLICE ISOFORM 1 OF REELIN PRECURSOR</u>	387531	Secreted, extracellular space, extracellular matrix	Serine protease	Brain	Plays a role in layering of neurons in the cerebral cortex and cerebellum. Regulates microtubule function in neurons and neuronal migration. Affects migration of sympathetic preganglionic neurons in the spinal cord, where it seems to act as a barrier to neuronal migration
8	20	Q01177	PLASMINOGEN PRECURSOR	90536	Secreted	Protease	Plasma	Plasmin dissolves the fibrin of blood clots and acts as a proteolytic factor in a variety of other processes including embryonic development, tissue remodeling, tumor invasion, and inflammation
8	12	O88752	EPSILON 1 GLOBIN	16105	Secreted	Oxygen Transport, Transfer - Carrier Protein	Blood	Involved in oxygen transport from the lung to the various peripheral tissues
8	13	P08934	SPLICE ISOFORM HMW OF KININOGEN-1 PRECURSOR	70933	Secreted	Cysteine protease inhibitor	Plasma	Bradykinin is released from kininogen by plasma kallikrein
8	19	P02680	SPLICE ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR	50633	Secreted	Blood clotting	Plasma	Monomers polymerize into fibrin and also acts as a cofactor in platelet aggregation

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
8	9	P55280	<u>CADHERIN-6 PRECURSOR</u>	88341	Cell Membrane	Cell adhesion	Highly expressed in kidney and brain	Also known as Kidney cadherin
7	9	P69897	<u>TUBULIN BETA-5 CHAIN</u>	49671	Intracellular	Cell structure, cell mobility, intracellular protein traffic	Ubiquitously expressed with highest levels in spleen, thymus and immature brain	Tubulin is the major constituent of microtubules
7	8	P01015	<u>ANGIOTENSINOGEN PRECURSOR</u>	51982	Secreted	Serine Protease Inhibitor	Expressed by the liver and secreted in plasma	Helps regulate volume and mineral balance of body fluids
7	8	P24054	<u>SPARC-LIKE PROTEIN 1 PRECURSOR</u>	70634	Secreted, extracellular space, extracellular matrix	Matrix glycoprotein Sc1	Expressed in many types of neurons in the brain	Function unknown, believed to bind calcium and play a role in brain development
7	7	P97603	<u>156 KDA PROTEIN - Neogenin precursor</u>	156144	Membrane	Cell adhesion	Widely expressed	May be involved as a regulatory protein in the transition of undifferentiated proliferating cells to their differentiated state. Belongs to the immunoglobulin superfamily.
7	9	P68136	<u>ACTIN, ALPHA SKELETAL MUSCLE</u>	42051	Cytoplasm	Cell structure, cell motility	Muscle	Actins are highly conserved proteins that are involved in various types of cell motility and are ubiquitously expressed in all eukaryotic cells.
7	9	P62630	<u>ELONGATION FACTOR 1-ALPHA 1</u>	50114	Cytoplasm	Protein biosynthesis, translation regulation	Ubiquitous	Links tRNA to ribosome during protein synthesis

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
7	7	P46462	<u>TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE</u>	89534	Intracellular	Protein targeting and localization, intracellular protein traffic	Ubiquitous	Necessary for the fragmentation of Golgi stacks during mitosis and for their reassembly after mitosis. Involved in the formation of the transitional endoplasmic reticulum (tER).
7	11	P02466	<u>COLLAGEN ALPHA-2(I) CHAIN PRECURSOR</u>	129564	Secreted, extracellular space, extracellular matrix	Cell adhesion - Cell structure	Forms the fibrils of tendon, ligaments and bones	Involved in skeletal development
7	7	P28494	<u>ALPHA-MANNOSIDASE 2</u>	131242	Golgi apparatus - Intracellular	Glycosidase	All tissues, mostly in adrenal and thymus	Involved in N-glycosylation
7	9	Q99J86	<u>SPLICE ISOFORM 1 OF ATTRACTIN PRECURSOR</u>	163296	Cell membrane	Cell adhesion - Immune defense	Widely distributed, highly expressed in colon and brain	Involved in the initial immune cell clustering during inflammatory response and may regulate chemotactic activity of chemokines. Has a critical role in normal myelination in the central nervous system, and enhancing cell survival against oxidative stress.
6	9	P68370	<u>TUBULIN ALPHA-1 CHAIN</u>	50136	Intracellular	Cell structure, cell mobility, chromosome segregation, intracellular protein traffic	Widely distributed	Tubulin is the major constituent of microtubules.
6	8	P97686	<u>SPLICE ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR</u>	133912	Cell membrane	Cell adhesion	Widely distributed, highly expressed in brain	Ankyrin-binding protein involved in neuron-neuron adhesion. May play a role in the molecular assembly of the nodes of Ranvier

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
6	8	Q91V15	<u>ALPHA-2-GLOBIN CHAIN</u>	15285	Secreted	Oxygen Transport, Transfer - Carrier Protein	Blood	Involved in oxygen transport from the lung to the various peripheral tissues
6	6	Q9WVR2	<u>ARCADLIN</u>	103800	Cell Membrane	Cell adhesion	Brain	Neural activity-regulated cadherin may be involved in long term potentiation
6	9	Q62657	<u>TENASCIN (FRAGMENT)</u>	62473	Secreted, extracellular space, extracellular matrix	Cell adhesion	Widely distributed	Negative regulation of cell adhesion
6	12	P04916	PREDICTED: RETINOL BINDING PROTEIN 4, PLASMA	23220	Secreted	Vitamin/Co-factor transport - retinol binding, transporter activity	Plasma	Delivers retinol from the liver stores to the peripheral tissues. In plasma, the RBP-retinol complex interacts with transthyretin, this prevents its loss by filtration through the kidney glomeruli.
6	10	GeneID:313717	<u>PREDICTED: CALSYNTENIN 1</u>	109351	Cell Membrane	Cell adhesion	Widely distributed	May modulate calcium-mediated postsynaptic signals
6	8	GeneID:302248	<u>PREDICTED: NIDOGEN 2</u>	173960	Secreted, extracellular space, extracellular matrix, basement membrane	Cell adhesion, Cell - extracellular matrix interaction	Widely distributed in basement membranes	Sulfated glycoprotein widely distributed in basement membranes and tightly associated with laminin. Also binds to collagen IV and perlecan. It probably has a role in cell-extracellular matrix interactions

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
6	7	P11980	<u>PREDICTED: SIMILAR TO PYRUVATE KINASE (EC 2.7.1.40) ISOZYME M2 - RAT</u>	57731	Intracellular	Carbohydrate degradation, glycolysis	Widely distributed	ATP + pyruvate = ADP + phosphoenolpyruvate
6	7	Q63581	<u>T-KININOGEN</u>	47618	Secreted	Cysteine protease inhibitor	Plasma	Plays a role in blood clotting and regulation of vasoconstriction and dilation
6	10	GeneID:84407	<u>PREDICTED: CADHERIN 11</u>	88036	Cell Membrane	Cell adhesion	Widely distributed	Involved in mesenchymal tissue formation
6	6	Q66HD0	<u>PREDICTED: TUMOR REJECTION ANTIGEN GP96</u>	74208	Cytoplasm	Molecular chaperone, protein folding, stress response	Widely distributed	Highly homologous to endoplasmic precursor
6	8	GeneID:290559	<u>PREDICTED: SIMILAR TO STABILIN-1</u>	288663	Membrane	Extracellular matrix structural protein, extracellular matrix protein-mediated signaling	High levels found in human spleen, lymph node, liver and placenta	Acts as a scavenger receptor for acetylated low density lipoprotein. Binds to both Gram-positive and Gram-negative bacteria and may play a role in defense against bacterial infection. When inhibited in endothelial tube formation assays, there is a marked decrease in cell-cell interactions, suggesting a role in angiogenesis
6	7	Q6MG73	<u>COMPLEMENT COMPONENT 2</u>	83699	Secreted	Serine protease, complement-mediated immunity	Plasma	Belongs to the peptidase S1 family
6	9	Q6IRS6	<u>FETUB PROTEIN</u>	43169	Secreted	Cysteine protease inhibitor	Liver	Inhibits insulin receptor tyrosine kinase activity.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
5	6	P62963	<u>PROFILIN-1</u>	14826	Intracellular	Cell structure	Ubiquitous	At high concentrations, profilin prevents the polymerization of actin, whereas it enhances it at low concentrations
5	5	Q5U300	<u>HYPOTHETICAL PROTEIN LOC314432, Similar to ubiquitin-protein ligase (EC 6.3.2.19) E1</u>	117788	Intracellular	Proteolysis	Ubiquitous	Ubiquitin activating enzyme activity
5	12	Q68FT8	<u>SERINE PEPTIDASE INHIBITOR, CLADE F, MEMBER 2</u>	54893	Secreted	Serine Protease Inhibitor	Plasma	Belongs to the serpin family
5	8	Q8JI03	<u>COLLAGEN ALPHA-1(V) CHAIN PRECURSOR</u>	184610	Secreted, extracellular space, extracellular matrix	<u>Extracellular matrix, Structural protein</u>	Ubiquitous	Component of connective tissue
5	5	P08649	<u>COMPLEMENT C4 PRECURSOR</u>	192163	Secreted	Complement-mediated immunity	Plasma	Inflammatory response
5	7	GeneID:307351	<u>HYPOTHETICAL PROTEIN RGD1305887-TUBULIN BETA CHAIN</u>	50059	Intracellular	Cell structure, cell mobility, chromosome segregation, intracellular protein traffic	Ubiquitous	Tubulin is the major constituent of microtubules
5	6	Q6IUJ3	<u>QUIESCIN Q6</u>	82412	Isoform 1: Membrane; Isoform 2: Secreted protein	Oxidase	Widely distributed, expressed in heart, placenta, lung, liver, skeletal muscle, pancreas and very weakly in brain and kidney	May contribute to disulfide bond formation in a variety of secreted proteins
5	6	GeneID:296371	<u>PREDICTED: SIMILAR TO PHOSPHOLIPID TRANSFER PROTEIN</u>	65430	Secreted	Lipid and fatty acid transport	Plasma	Involved in phospholipid transfer in the serum.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
5	5	Q63041	<u>ALPHA-1-MACROGLOBULIN</u>	167125	Secreted	Serine protease inhibitor	Plasma	Also known as PREGNANCY ZONE PROTEIN
5	5	GeneID:21846	<u>PREDICTED: TYROSINE KINASE RECEPTOR 1</u>	125210	Cell Membrane	Receptor protein-tyrosine kinase	Unknown	Unknown
5	26	Q08420	<u>EXTRACELLULAR SUPEROXIDE DISMUTASE [CU-ZN] PRECURSOR</u>	26620	Secreted, extracellular space, extracellular matrix	Oxidoreductase - Immunity and Defense	Widely distributed	Destroys radicals which are normally produced within the cells and which are toxic to biological systems.
5	11	Q6AYQ9	<u>PEPTIDYLPROLYL ISOMERASE C</u>	23009	Cytoplasm	Isomerase, Protein folding, Nuclear transport	Widely distributed, highly expressed in eye, vascular tissue, kidney and brain	Involved in immunity and defense
5	6	Q62918	<u>PROTEIN KINASE C-BINDING PROTEIN NELL2</u>	91334	Secreted	Cell communication, Cell adhesion, Cell structure	Widely distributed	Regulation of growth and neurogenesis
4	7	GeneID:114489	<u>PREDICTED: DYSTROGLYCAN 1</u>	96706	Membrane	Extracellular matrix protein-mediated signaling	Ubiquitous	Basement membrane
4	4	O35217	<u>PREDICTED: SIMILAR TO HEPATIC MULTIPLE INOSITOL POLYPHOSPHATE PHOSPHATASE</u>	54619	Endoplasmic reticulum	Nucleotide phosphatase	Widely expressed with highest levels in kidney and liver	Calcium mediated signaling involved in cell proliferation and differentiation
4	4	Q91XN5	<u>PROMININ-1S1 SPLICE VARIANT</u>	96632	Cell Membrane	Cellular component, integral to membrane	Hematopoietic stem cells, retina, placenta, lung, brain	May be involved in membrane traffic. Has been localized to extracellular membrane bound particles in the CSF.
4	5	O88754	<u>EPSILON 3 GLOBIN</u>	16540	Secreted	Oxygen Transport, Transfer - Carrier Protein	Blood	Involved in oxygen transport from the lung to the various peripheral tissues

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4	9	P14841	<u>CYSTATIN C PRECURSOR</u>	15437	Secreted, extracellular space, extracellular matrix	Cysteine protease inhibitor	Widely distributed with high expression in brain and muscle	Regulation of programmed cell death
4	4	GeneID:295027	<u>PREDICTED: SIMILAR TO PROTOCADHERIN 18 PRECURSOR</u>	123552	Cell Membrane	Cell adhesion	Expressed in brain	May be involved in the establishment and maintenance of specific neuronal connections in the brain
4	7	Q9ERB4	<u>SPLICE ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR (FRAGMENT)</u>	300008	Secreted, extracellular space, extracellular matrix	Extracellular matrix protein-mediated signaling, cell adhesion, cell motility	Widely distributed	May be involved in axon regeneration and physiological response to wounding
4	5	GeneID:116782	<u>PROTOCADHERIN GAMMA SUBFAMILY C.3</u>	101038	Cell Membrane	Cell adhesion	Widely distributed, highly expressed in pineal gland	May play a role during spermatogenesis
4	4	O54861	<u>SORTILIN PRECURSOR</u>	91169	Membranes; localized endosomes, golgi, lysosomes and nucleus	Functions as a sorting receptor, endocytosis, general intracellular vesicle transport	Highly expressed in fat, brain, and lung	Also known as Neurotensin receptor 3
4	4	O88600	<u>ISCHEMIA RESPONSIVE 94 KDA PROTEIN</u>	94057	Intracellular, Cytoplasm	Heat shock, protein folding, stress response	Widely distributed	Heat shock 70 kDa protein 4
4	4	Q63002	<u>MANNOSE 6 PHOSPHATE/INSULIN-LIKE GROWTH FACTOR II RECEPTOR</u>	273608	Cell Membrane	Insulin/IGF signaling pathway	Widely distributed	Soluble receptor found in serum, amniotic fluid and urine.
4	5	Q91YB6	<u>COMPLEMENT INHIBITORY FACTOR H</u>	140344	Secreted	Complement-mediated immunity	Plasma	Regulation of complement activation
4	6	Q62701	<u>TENASCIN (FRAGMENT)</u>	67815	Secreted, extracellular space, extracellular matrix	Cell adhesion, extracellular matrix glycoprotein-mediated signaling	Widely distributed	Negative regulation of cell adhesion. Ligand for integrin receptors.

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4	4	GeneID:311416	<u>PREDICTED: SIMILAR TO VINCULIN</u>	116615	Intracellular	Cell adhesion, cell structure	Unknown	Non-motor actin binding protein
3	3	P63102	<u>14-3-3 PROTEIN ZETA/DELTA</u>	27771	Cytoplasm	Chaperone, signal transduction	Highly expressed in brain	Adapter protein implicated in the regulation of a large spectrum of both general and specialized signaling pathway
3	4	P07335	<u>CREATINE KINASE B-TYPE</u>	42712	Cytoplasm	Kinase, energy modulation	Brain specific isoform	Phosphocreatine metabolism that may be necessary for brain development
3	3	P35704	<u>PEROXIREDOXIN-2</u>	21652	Cytoplasm	Oxidoreductase, Peroxidase	Widely distributed, highly expressed in bone marrow, heart, brain, kidney and muscle	Antioxidation and free radical removal
3	3	GeneID:366031	<u>PREDICTED: SIMILAR TO CRB2 PROTEIN</u>	138781	Membrane	Membrane-bound signaling molecule?	Unknown	Immunity and defense, mRNA transcription regulation
3	4	P60711	<u>ACTIN, CYTOPLASMIC 1</u>	41737	Cytoplasm	Cell structure, cell mobility, intracellular protein traffic	Ubiquitous	Actins are highly conserved proteins that are involved in various types of cell motility and are ubiquitously expressed in all eukaryotic cells.
3	4	P35952	<u>LOW-DENSITY LIPOPROTEIN RECEPTOR PRECURSOR</u>	96622	Cell Membrane	Lipid and fatty acid transport and metabolism	Plasma	Binds LDL, the major cholesterol-carrying lipoprotein of plasma, and transports it into cells by endocytosis
3	3	P12785	<u>FATTY ACID SYNTHASE</u>	272650	Intracellular-cytoplasm	Lipid and fatty acid biosynthesis	Ubiquitously expressed	Involved in catalyzing the formation of long chain fatty acids.

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
3	4	P10111	<u>PEPTIDYL-PROLYL CIS-TRANS ISOMERASE A</u>	17743	Cytoplasm	Isomerase, Protein folding, Nuclear transport	Widely distributed, highly expressed in nerve ganglia	PPases accelerate the folding of proteins
3	4	P07151	<u>BETA-2-MICROGLOBULIN PRECURSOR</u>	13720	Cell Membrane	Immune response, Major histocompatibility complex antigen	Expressed on nucleated cells	Beta-chain of major histocompatibility complex class I molecules
3	6	Q62632	<u>FOLLISTATIN-RELATED PROTEIN 1 PRECURSOR</u>	34622	Secreted	Select regulatory molecule - Homeostatis	Widely distributed, highly expressed in vascular tissue and nerve ganglia	Modulates action of some growth factors on cell proliferation and differentiation
3	3	Q5M822	<u>SERINE (OR CYSTEINE) PROTEINASE INHIBITOR, CLADE A (ALPHA-1 ANTITRYPSIN), MEMBER 6</u>	44671	Secreted	Serine Protease Inhibitor	Plasma	Belongs to the serpin family
3	6	Q63555	<u>SP120 - Heterogeneous nuclear ribonucleoprotein U</u>	87748	Intracellular	Transporter activity - RNA binding	Widely distributed	Nuclear scaffold protein
3	6	Q6PED0	<u>RIBOSOMAL PROTEIN S27A</u>	17951	Intracellular	Protein biosynthesis	Ubiquitous	Ribosomal structural protein
3	4	Q62656	<u>SPLICE ISOFORM 2 OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA PRECURSOR</u>	164596	Cell Membrane	Cell surface receptor mediated signal transduction	CNS	May be involved in the regulation of specific developmental processes in the CNS.
3	3	P31000	<u>VIMENTIN</u>	53602	Intracellular	Cell structure	Widely distributed, highly expressed in nerve ganglia	Found in various non-epithelial cells, especially mesenchymal cells
3	3	P97536	<u>CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1</u>	136362	Nucleus	Transcriptional Enhancer	Detected in heart, brain, spleen, liver, skeletal muscle, kidney and testis	Also negative regulator of ubiquitin ligase complex

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3	3	O70535	<u>LEUKEMIA INHIBITORY FACTOR RECEPTOR PRECURSOR</u>	122394	Isoform 1: Cell membrane; Isoform 2: Secreted	Cytokine receptor - Signal transducing molecule	Secreted form found in plasma. Membrane form highly expressed in placenta, liver, kidney, heart, lung and brain.	The soluble form inhibits the biological activity of LIF by blocking its binding to receptors on target cells
3	3	P11442	<u>CLATHRIN HEAVY CHAIN</u>	191599	Intracellular - vesicle coat	Ligand-mediated signaling, Receptor mediated endocytosis	Ubiquitously expressed	Involved in the formation of clathrin coated vesicles during vesicle endocytosis
2	3	P01835	<u>IG KAPPA CHAIN C REGION, B ALLELE</u>	11601	Secreted	Immunoglobulin; B-cell and antibody-mediated immunity	Lymphoreticular tissue	Immunoglobulin family
2	2	Q5RK11	<u>EUKARYOTIC TRANSLATION INITIATION FACTOR 4A2</u>	46489	Intracellular	Protein biosynthesis, Translation Initiation factor	Ubiquitous	Required for mRNA binding to ribosome
2	3	P04276	<u>VITAMIN D-BINDING PROTEIN PRECURSOR</u>	53544	Secreted	Transport	Found in plasma, ascitic fluid, cerebrospinal fluid, and urine and on the surface of many cell types.	Binds and carries vitamin D and also prevents actin polymerization
2	3	GeneID:500303	<u>PREDICTED: SIMILAR TO ALPHA ENOLASE</u>	46489	Cytoplasm. Cell membrane	Glycolysis and plasminogen activation	Expressed in embryo and in most adult tissues, striated muscle, neurons	Multifunctional enzyme that plays a part in various processes such as growth control, hypoxia tolerance and allergic responses. May also function in the fibrinolytic system due to its ability to serve as a receptor and activator of plasminogen on the cell surface of several cell types

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2	3	Q9R0T4	<u>EPITHELIAL-CADHERIN PRECURSOR</u>	98715	Cell Membrane, Cell junction	Cell adhesion	Widely distributed, highly expressed in the colon	May play a role in axonal growth and synapse formation
2	2	Q6P502	<u>PREDICTED: similar to T-complex protein 1 subunit theta</u>	59745	Cytoplasm	Chaperone	Widely distributed, highly expressed in brain	Belongs to the TCP-1 chaperonin family
2	2	Q66HD3	<u>NUCLEAR AUTOANTIGENIC SPERM PROTEIN</u>	84200	Intracellular	Transport	Widely expressed	Required for DNA replication, normal cell cycle progression and cell proliferation
2	2	GeneID:363155	<u>PREDICTED: SIMILAR TO PROGRAMMED CELL DEATH 6 INTERACTING PROTEIN</u>	75806	Cytoplasm	Transmembrane receptor regulatory/adaptor protein	Expressed in astrocytes and glioma cells	DNA damage response, signal transduction resulting in induction of apoptosis
2	2	P34058	<u>HEAT SHOCK PROTEIN HSP 90-BETA</u>	83185	Cytoplasm	Chaperone, protein folding, stress response	Ubiquitous	Belongs to the heat shock protein 90 family
2	6	Q71D11	<u>DERMCIDIN</u>	11284	Secreted	Neuronal survival, phosphatase activity	Brain, skin	A maternal blood-borne factor promotes survival of the developing thalamus
2	8	Q64240	<u>AMBIPROTEIN PRECURSOR</u>	38851	Secreted	Serine protease inhibitor	Plasma, urine, and cerebrospinal fluid	It appears not only as a free monomer but also in complexes with IgA and albumin
2	2	Q8VID2	<u>PREDICTED: AMINOPEPTIDASE PUROMYCIN SENSITIVE</u>	103344	Cytoplasm	Metalloprotease - Aminopeptidase activity	Widely distributed, highly detected in hippocampus	Also known as METALLOPROTEASE MP100
2	2	GeneID:293860	<u>PREDICTED: SIMILAR TO FILAMIN A</u>	290169	Intracellular	Cell structure, Cell motility	Ubiquitous	Non-motor actin binding protein
2	2	Q9JLT0	MYOSIN-10	228965	Intracellular	Cell structure, cell motility	Brain	Actin binding motor protein
2	4	P15865	HISTONE H1.2	21856	Nucleus	Chromatin packaging and remodeling	Ubiquitous	Necessary for condensation of nuclear DNA

# of unique peptides from protein	Total # of peptides	Accession Number	Name of Protein	MW	Subcellular location	Function	Tissue specificity	Notes
2	2	Q8K586	<u>GTP-BINDING NUCLEAR PROTEIN RAN. TESTIS-SPECIFIC ISOFORM</u>	24451	Nucleus	Nucleocytoplasmic transport	Testis	Required for the import of protein into the nucleus and also for RNA export.
2	2	P62260	<u>14-3-3 PROTEIN EPSILON</u>	29174	Cytoplasm	Chaperone, signal transduction	Present at high levels in the pineal gland early in development	Adapter protein implicated in the regulation of a large spectrum of both general and specialized signaling pathway

Table 4. Protein list from mass spectrometry of all individual samples of embryonic rat CSF collected from E12.5 lateral ventricle (LV), E14.5 lateral ventricle (LV), 4th ventricle (4thV), and E17.5 lateral ventricle (LV).

# of unique peptide from protein	Total # of peptides	Protein matches E12.5	# of unique peptides from protein	Total # of peptides	Protein matches E14 LV	# of unique peptides from protein	Total number of peptides	Protein matches E14 4thV	# of unique peptides from protein	Total # of peptides	Protein matches E17.5 LV
121	587	Rattus norvegicus (Rat) AA1064-apolipoprotein B. [MASS=536024]	107	437	Rattus norvegicus (Rat) AA1064-apolipoprotein B. [MASS=536024]	120	617	Rattus norvegicus (Rat) AA1064-apolipoprotein B. [MASS=536024]	111	414	Rattus norvegicus (Rat) AA1064-apolipoprotein B. [MASS=536024]
64	367	Rattus norvegicus (Rat) Apolipoprotein B - fragment. [MASS=165356]	62	293	Rattus norvegicus (Rat) Apolipoprotein B - fragment. [MASS=165356]	66	382	Rattus norvegicus (Rat) Apolipoprotein B - fragment. [MASS=165356]	58	226	Rattus norvegicus (Rat) Apolipoprotein B - fragment. [MASS=165356]
34	96	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRONECTIN PRECURSOR. [MASS=272511]	34	73	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRONECTIN PRECURSOR. [MASS=272511]	37	135	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRONECTIN PRECURSOR. [MASS=272511]	45	61	Rattus norvegicus (Rat) DYNEIN HEAVY CHAIN, CYTOSOLIC. [MASS=532252]
29	104	Rattus norvegicus (Rat) APOLIPOPROTEIN A-IV PRECURSOR. [MASS=44456]	32	90	Rattus norvegicus (Rat) APOLIPOPROTEIN A-IV PRECURSOR. [MASS=44456]	34	365	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ALPHA-FETOPROTEIN PRECURSOR. [MASS=68386]	40	55	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN A. [MASS=290169]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
28	32	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN A. [MASS=290169]	29	290	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ALPHA-FETOPROTEIN PRECURSOR. [MASS=68386]	31	120	Rattus norvegicus (Rat) APOLIPOPROTEIN A-IV PRECURSOR. [MASS=44456]	39	44	Rattus norvegicus (Rat) FATTY ACID SYNTHASE. [MASS=272650]
27	227	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ALPHA-FETOPROTEIN PRECURSOR. [MASS=68386]	24	54	Rattus norvegicus (Rat) ALPHA-2-MACROGLOBULIN PRECURSOR. [MASS=163701]	28	53	Rattus norvegicus (Rat) ALPHA-2-MACROGLOBULIN PRECURSOR. [MASS=163701]	39	79	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRONECTIN PRECURSOR. [MASS=272511]
26	62	Rattus norvegicus (Rat) ALPHA-1-INHIBITOR 3 PRECURSOR. [MASS=163773]	24	30	Rattus norvegicus (Rat) GPI-ANCHORED CERULOPLASMIN. [MASS=123749]	21	26	Rattus norvegicus (Rat) GPI-ANCHORED CERULOPLASMIN. [MASS=123749]	37	99	Rattus norvegicus (Rat) ALPHA-2-MACROGLOBULIN PRECURSOR. [MASS=163701]
26	32	Rattus norvegicus (Rat) FATTY ACID SYNTHASE. [MASS=272650]	22	38	Rattus norvegicus (Rat) ALPHA-1-INHIBITOR 3 PRECURSOR. [MASS=163773]	21	35	Rattus norvegicus (Rat) ALPHA-1-INHIBITOR 3 PRECURSOR. [MASS=163773]	33	418	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ALPHA-FETOPROTEIN PRECURSOR. [MASS=68386]
22	33	Rattus norvegicus (Rat) GPI-ANCHORED CERULOPLASMIN. [MASS=123749]	21	22	Rattus norvegicus (Rat) FATTY ACID SYNTHASE. [MASS=272650]	20	96	Rattus norvegicus (Rat) BA1-667 - Transferrin. [MASS=107448]	28	30	Rattus norvegicus (Rat) MYOSIN-10. [MASS=228965]
20	123	Rattus norvegicus (Rat) SERUM ALBUMIN PRECURSOR. [MASS=68719]	21	96	Rattus norvegicus (Rat) BA1-667 - Transferrin. [MASS=107448]	19	30	Rattus norvegicus (Rat) CONTACTIN-2 PRECURSOR. [MASS=113043]	26	78	Rattus norvegicus (Rat) APOLIPOPROTEIN A-IV PRECURSOR. [MASS=44456]
19	20	Rattus norvegicus (Rat) MYOSIN-10. [MASS=228965]	19	60	Rattus norvegicus (Rat) APOLIPOPROTEIN A-1 PRECURSOR. [MASS=30088]	18	79	Rattus norvegicus (Rat) APOLIPOPROTEIN A-1 PRECURSOR. [MASS=30088]	25	33	Rattus norvegicus (Rat) CONTACTIN-1 PRECURSOR. [MASS=113495]
18	38	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN 86. [MASS=84815]	19	112	Rattus norvegicus (Rat) SERUM ALBUMIN PRECURSOR. [MASS=68719]	18	97	Rattus norvegicus (Rat) SERUM ALBUMIN PRECURSOR. [MASS=68719]	23	160	Rattus norvegicus (Rat) SERUM ALBUMIN PRECURSOR. [MASS=68719]
18	27	Rattus norvegicus (Rat) ELONGATION FACTOR 2. [MASS=95153]	17	19	Rattus norvegicus (Rat) PREDICTED: NIDOGEN. [MASS=138365]	18	33	Rattus norvegicus (Rat) PREDICTED: NIDOGEN. [MASS=138365]	23	29	Rattus norvegicus (Rat) ALPHA-1-MACROGLOBULIN. [MASS=167125]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
18	43	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PYRUVATE KINASE (EC 2.7.1.40) ISOZYME M2 - RAT. [MASS=57731]	15	38	Rattus norvegicus (Rat) ALPHA-1- ANTIPROTEINASE PRECURSOR. [MASS=46136]	15	34	Rattus norvegicus (Rat) ALPHA-1- ANTIPROTEINASE PRECURSOR. [MASS=46136]	20	21	Rattus norvegicus (Rat) MYOSIN-9. [MASS=226207]
17	32	Rattus norvegicus (Rat) ALPHA-1- ANTIPROTEINASE PRECURSOR. [MASS=46136]	15	20	Rattus norvegicus (Rat) CONTACTIN-2 PRECURSOR. [MASS=113043]	15	17	Rattus norvegicus (Rat) DA1-24-Complement Factor B. [MASS=124379]	20	49	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO INTER-ALPHA-INHIBITOR H2 CHAIN. [MASS=105715]
17	25	Rattus norvegicus (Rat) COMPLEMENT C3 PRECURSOR. [MASS=186460]	14	18	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN 86. [MASS=84815]	14	23	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CADHERIN-5. [MASS=135230]	19	47	Rattus norvegicus (Rat) ALPHA-1-ANTIPROTEINASE PRECURSOR. [MASS=46136]
17	63	Rattus norvegicus (Rat) BA1-667 - Transferrin. [MASS=107448]	14	29	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PYRUVATE KINASE (EC 2.7.1.40) ISOZYME M2 - RAT. [MASS=57731]	13	20	Rattus norvegicus (Rat) ALPHA-2 ANTIPLASMIN. [MASS=46465]	19	24	Rattus norvegicus (Rat) ELONGATION FACTOR 2. [MASS=95153]
16	56	Rattus norvegicus (Rat) APOLIPOPROTEIN A-I PRECURSOR. [MASS=30088]	12	17	Rattus norvegicus (Rat) ALPHA-2 ANTIPLASMIN. [MASS=46465]	13	18	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF AGRIN PRECURSOR. [MASS=208646]	19	19	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CAD PROTEIN. [MASS=250725]
16	28	Rattus norvegicus (Rat) ALPHA-2- MACROGLOBULIN PRECURSOR. [MASS=163701]	12	24	Rattus norvegicus (Rat) NEURAL-CADHERIN PRECURSOR. [MASS=99686]	13	25	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEPARAN SULFATE PROTEOGLYCAN 2. [MASS=377284]	18	24	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN LOC314432-Similar to ubiquitin-protein ligase (EC 6.3.2.19) E1. [MASS=117788]
16	17	Rattus norvegicus (Rat) CLATHRIN HEAVY CHAIN. [MASS=191599]	12	22	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CADHERIN-5. [MASS=135230]	13	19	Rattus norvegicus (Rat) INTER-ALPHA- INHIBITOR H4 HEAVY CHAIN. [MASS=103755]	18	102	Rattus norvegicus (Rat) BA1- 667 - Transferrin. [MASS=107448]
14	14	Rattus norvegicus (Rat) DYNEIN HEAVY CHAIN, CYTOSOLIC. [MASS=532252]	12	14	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ B1. [MASS=228429]	12	14	Rattus norvegicus (Rat) GELSOLIN. [MASS=86286]	17	20	Rattus norvegicus (Rat) DA1- 24-Complement Factor B. [MASS=124379]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
13	23	Rattus norvegicus (Rat) RAT ALPHA(1)- INHIBITOR 3, VARIANT I PRECURSOR. [MASS=165326]	11	12	Rattus norvegicus (Rat) GELSOLIN. [MASS=86286]	12	15	Rattus norvegicus (Rat) SERINE/CYSTEINE PROTEINASE INHIBITOR, CLADE C, MEMBER 1. [MASS=52234]	17	34	Rattus norvegicus (Rat) PREDICTED: MICROTUBULE- ASSOCIATED PROTEIN 1B. [MASS=269643]
13	16	Rattus norvegicus (Rat) PREDICTED: NIDOGN. [MASS=138365]	11	13	Rattus norvegicus (Rat) ELONGATION FACTOR 2. [MASS=95153]	12	22	Rattus norvegicus (Rat) COMPLEMENT C3 PRECURSOR. [MASS=186460]	16	17	Rattus norvegicus (Rat) CONTACTIN-2 PRECURSOR. [MASS=113043]
13	13	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CAD PROTEIN. [MASS=250725]	11	18	Rattus norvegicus (Rat) COMPLEMENT C3 PRECURSOR. [MASS=186460]	12	24	Rattus norvegicus (Rat) APOLIPOPROTEIN E PRECURSOR. [MASS=35753]	16	23	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN 86. [MASS=84815]
13	15	Rattus norvegicus (Rat) VIMENTIN. [MASS=53602]	11	13	Rattus norvegicus (Rat) TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE. [MASS=89534]	11	14	Rattus norvegicus (Rat) LAR RECEPTOR- LINKED TYROSINE PHOSPHATASE. [MASS=181130]	16	17	Rattus norvegicus (Rat) CLATHRIN HEAVY CHAIN. [MASS=191599]
13	14	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GCN1 GENERAL CONTROL OF AMINO- ACID SYNTHESIS 1- LIKE 1. [MASS=302942]	11	11	Rattus norvegicus (Rat) NUCLEAR AUTOANTIGENIC SPERM PROTEIN. [MASS=84200]	11	12	Rattus norvegicus (Rat) DELETED IN COLORECTAL CANCER. [MASS=158142]	15	25	Rattus norvegicus (Rat) COMPLEMENT C3 PRECURSOR. [MASS=186460]
12	12	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN LOC314432- Similar to ubiquitin-protein ligase (EC 6.3.2.19) E1. [MASS=117788]	11	18	Rattus norvegicus (Rat) CORTICOSTEROID- BINDING GLOBULIN PRECURSOR. [MASS=44672]	11	12	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE G, MEMBER 1. [MASS=55611]	15	15	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GCN1 GENERAL CONTROL OF AMINO-ACID SYNTHESIS 1- LIKE 1. [MASS=302942]
12	17	Rattus norvegicus (Rat) ATP-CITRATE SYNTHASE. [MASS=120781]	11	22	Rattus norvegicus (Rat) APOLIPOPROTEIN E PRECURSOR. [MASS=35753]	11	17	Rattus norvegicus (Rat) CORTICOSTEROID- BINDING GLOBULIN PRECURSOR. [MASS=44672]	14	32	Rattus norvegicus (Rat) APOLIPOPROTEIN A-1 PRECURSOR. [MASS=30088]
12	15	Rattus norvegicus (Rat) TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE. [MASS=89534]	10	47	Rattus norvegicus (Rat) TRANSTHYRETIN PRECURSOR. [MASS=15720]	11	12	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ B1. [MASS=228429]	14	46	Rattus norvegicus (Rat) CORTICOSTEROID-BINDING GLOBULIN PRECURSOR. [MASS=44672]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
11	14	Rattus norvegicus (Rat) ALPHA-2 ANTIPLASMIN. [MASS=46465]	10	17	Rattus norvegicus (Rat) RAT ALPHA(1)-INHIBITOR 3, VARIANT 1. PRECURSOR. [MASS=165326]	11	11	Rattus norvegicus (Rat) ELONGATION FACTOR 2. [MASS=95153]	14	15	Rattus norvegicus (Rat) CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1. [MASS=136362]
11	12	Rattus norvegicus (Rat) IMPORTIN BETA-1 SUBUNIT. [MASS=97184]	10	13	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 6. PRECURSOR. [MASS=46652]	11	14	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR. [MASS=86686]	14	42	Rattus norvegicus (Rat) TUBULIN ALPHA-1 CHAIN. [MASS=50136]
11	14	Rattus norvegicus (Rat) CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1. [MASS=136362]	10	12	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO KINESIN FAMILY MEMBER 23. [MASS=108791]	11	16	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA 3 TYPE VI COLLAGEN ISOFORM 1 PRECURSOR. [MASS=369017]	14	14	Rattus norvegicus (Rat) GPI-ANCHORED CERULOPLASMIN. [MASS=123749]
11	40	Rattus norvegicus (Rat) TUBULIN ALPHA-1 CHAIN. [MASS=50136]	10	16	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(I) CHAIN PRECURSOR. [MASS=137886]	10	21	Rattus norvegicus (Rat) NEURAL-CADHERIN PRECURSOR. [MASS=99686]	14	28	Rattus norvegicus (Rat) ECTONUCLEOTIDE PYROPHOSPHATASE/PHOSPHODIESTERASE 2. [MASS=101310]
11	18	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FIBULIN-1 PRECURSOR. [MASS=78072]	10	10	Rattus norvegicus (Rat) GLATHRIN HEAVY CHAIN. [MASS=191599]	10	14	Rattus norvegicus (Rat) PREDICTED: LAMININ, GAMMA 1. [MASS=177387]	13	18	Rattus norvegicus (Rat) GELSOLIN. [MASS=86286]
11	18	Rattus norvegicus (Rat) APOLIPOPROTEIN E PRECURSOR. [MASS=35753]	9	20	Rattus norvegicus (Rat) TUBULIN ALPHA-1 CHAIN. [MASS=50136]	10	22	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FIBULIN-1 PRECURSOR. [MASS=78072]	13	15	Rattus norvegicus (Rat) VIMENTIN. [MASS=53602]
11	11	Rattus norvegicus (Rat) Glutamyl-prolyl-IRNA synthetase. [MASS=170088]	9	9	Rattus norvegicus (Rat) LAR RECEPTOR- LINKED TYROSINE PHOSPHATASE. [MASS=181130]	10	11	Rattus norvegicus (Rat) ECTONUCLEOTIDE PYROPHOSPHATASE/P HOSPHODIESTERASE 2. [MASS=101310]	12	21	Rattus norvegicus (Rat) TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE. [MASS=89534]
11	11	Rattus norvegicus (Rat) MYOSIN-9. [MASS=226207]	9	11	Rattus norvegicus (Rat) IMPORTIN BETA-1 SUBUNIT. [MASS=97184]	10	21	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(I) CHAIN PRECURSOR. [MASS=137886]	12	12	Rattus norvegicus (Rat) COMPLEMENT COMPONENT 2. [MASS=83699]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
11	15	<u>Rattus norvegicus (Rat)</u> <u>INTER-ALPHA-INHIBITOR H4 HEAVY CHAIN</u> , [MASS=103755]	9	9	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: VON WILLEBRAND FACTOR</u> , [MASS=308474]	10	21	<u>Rattus norvegicus (Rat)</u> <u>LUMICAN PRECURSOR</u> , [MASS=38279]	12	15	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO DESMOPLASTIN ISOFORM II</u> , [MASS=264186]
10	12	<u>Rattus norvegicus (Rat)</u> <u>GELSOLIN</u> , [MASS=86286]	9	15	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO HEPARAN SULFATE PROTEOGLYCAN 2</u> , [MASS=377284]	9	51	<u>Rattus norvegicus (Rat)</u> <u>TRANSFERRIN PRECURSOR</u> , [MASS=15720]	12	15	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO ALPHA 3 TYPE VI COLLAGEN ISOFORM 1 PRECURSOR</u> , [MASS=369017]
10	10	<u>Rattus norvegicus (Rat)</u> <u>NUCLEAR AUTOANTIGENIC SPERM PROTEIN</u> , [MASS=84200]	9	9	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: LAMININ, GAMMA 1</u> , [MASS=177387]	9	13	<u>Rattus norvegicus (Rat)</u> <u>CATHEPSIN B PRECURSOR</u> , [MASS=37470]	11	11	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO COATOMER PROTEIN COMPLEX SUBUNIT ALPHA</u> , [MASS=138360]
10	16	<u>Rattus norvegicus (Rat)</u> <u>SP120-Heterogeneous nuclear ribonucleoprotein U</u> , [MASS=87748]	9	20	<u>Rattus norvegicus (Rat)</u> <u>LUMICAN PRECURSOR</u> , [MASS=38279]	9	10	<u>Rattus norvegicus (Rat)</u> <u>FIBRINOGEN BETA CHAIN PRECURSOR</u> , [MASS=54303]	11	19	<u>Rattus norvegicus (Rat)</u> <u>CLUSTERIN PRECURSOR</u> , [MASS=51375]
10	11	<u>Rattus norvegicus (Rat)</u> <u>CONTACTIN-2 PRECURSOR</u> , [MASS=113043]	9	9	<u>Rattus norvegicus (Rat)</u> <u>Neogenin precursor</u> , [MASS=156144]	9	13	<u>Rattus norvegicus (Rat)</u> <u>RAT ALPHA(1)-INHIBITOR 3 VARIANT 1 PRECURSOR</u> , [MASS=165326]	11	16	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO PYRUVATE KINASE (EC 2.7.1.40) ISOZYME M2 - RAT</u> , [MASS=57731]
9	10	<u>Rattus norvegicus (Rat)</u> <u>PHOSPHOGLYCERATE KINASE 1</u> , [MASS=44423]	9	16	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO FIBULIN-1 PRECURSOR</u> , [MASS=78072]	9	11	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: VON WILLEBRAND FACTOR</u> , [MASS=308474]	11	15	<u>Rattus norvegicus (Rat)</u> <u>ALPHA-1-INHIBITOR 3 PRECURSOR</u> , [MASS=163773]
9	10	<u>Rattus norvegicus (Rat)</u> <u>HEAT SHOCK COGNATE 71 KDA PROTEIN</u> , [MASS=70871]	9	10	<u>Rattus norvegicus (Rat)</u> <u>DAI-24-Complement Factor B</u> , [MASS=124379]	9	18	<u>Rattus norvegicus (Rat)</u> <u>LOC367586 PROTEIN-Immunoglobulin Gamma heavy Chain</u> , [MASS=50949]	11	11	<u>Rattus norvegicus (Rat)</u> <u>HEPHAESTIN PRECURSOR</u> , [MASS=129593]
9	22	<u>Rattus norvegicus (Rat)</u> <u>TUBULIN BETA-5 CHAIN</u> , [MASS=49671]	9	12	<u>Rattus norvegicus (Rat)</u> <u>ACTIN, ALPHA SKELETAL MUSCLE</u> , [MASS=42051]	9	11	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM LONG OF HYALURONAN AND PROTEOGLYCAN LINK PROTEIN 1 PRECURSOR</u> , [MASS=40262]	11	36	<u>Rattus norvegicus (Rat)</u> <u>LOC367586 PROTEIN-Immunoglobulin Gamma heavy Chain</u> , [MASS=50949]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
9	12	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 6 PRECURSOR. [MASS=46652]	9	13	Rattus norvegicus (Rat) INTER-ALPHA-INHIBITOR H4 HEAVY CHAIN. [MASS=103755]	8	10	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN 86. [MASS=84815]	11	19	Rattus norvegicus (Rat) ACTIN, ALPHA SKELETAL MUSCLE. [MASS=42051]
9	19	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN RGD1305887-TUBULIN BETA CHAIN. [MASS=50059]	8	16	Rattus norvegicus (Rat) TUBULIN BETA-5 CHAIN. [MASS=49671]	8	8	Rattus norvegicus (Rat) HEPHAESTIN PRECURSOR. [MASS=129593]	10	20	Rattus norvegicus (Rat) NEURAL-CADHERIN PRECURSOR. [MASS=99686]
9	11	Rattus norvegicus (Rat) PROMININ-1S1 SPLICE VARIANT. [MASS=96632]	8	14	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 1 PRECURSOR. [MASS=46562]	8	13	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(III) CHAIN PRECURSOR. [MASS=138936]	10	105	Rattus norvegicus (Rat) TRANSTHYRETIN PRECURSOR. [MASS=15720]
9	9	Rattus norvegicus (Rat) IKAP. [MASS=149171]	8	14	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE G, MEMBER 1. [MASS=55611]	8	9	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF REELIN PRECURSOR. [MASS=387531]	10	11	Rattus norvegicus (Rat) IMPORTIN BETA-1 SUBUNIT. [MASS=97184]
9	10	Rattus norvegicus (Rat) PREDICTED: NEURAL PRECURSOR CELL EXPRESSED, DEVELOPMENTALLY DOWN-REGULATED GENE 4A. [MASS=112368]	8	9	Rattus norvegicus (Rat) ISCHEMIA RESPONSIVE 94 KDA PROTEIN. [MASS=94057]	8	20	Rattus norvegicus (Rat) PLASMINOGEN PRECURSOR. [MASS=90536]	10	10	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CELLULAR APOPTOSIS SUSCEPTIBILITY PROTEIN. [MASS=110214]
9	18	Rattus norvegicus (Rat) ACTIN, ALPHA SKELETAL MUSCLE. [MASS=42051]	8	8	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN LOC314432-Similar to ubiquitin-protein ligase (EC 6.3.2.19) E1. [MASS=117786]	8	12	Rattus norvegicus (Rat) EPSILON 1 GLOBIN. [MASS=16105]	10	11	Rattus norvegicus (Rat) NUCLEAR AUTOANTIGENIC SPERM PROTEIN. [MASS=84200]
9	27	Rattus norvegicus (Rat) ELONGATION FACTOR 1-ALPHA 1. [MASS=50114]	8	10	Rattus norvegicus (Rat) HEPHAESTIN PRECURSOR. [MASS=129593]	8	13	Rattus norvegicus (Rat) SPLICE ISOFORM HMW OF KININOGEN-1 PRECURSOR. [MASS=70933]	10	11	Rattus norvegicus (Rat) ISCHEMIA RESPONSIVE 94 KDA PROTEIN. [MASS=94057]

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9	12	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEPARAN SULFATE PROTEOGLYCAN 2. [MASS=377284]	8	15	Rattus norvegicus (Rat) PLASMINOGEN PRECURSOR. [MASS=90536]	8	19	Rattus norvegicus (Rat) SPLICE ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR. [MASS=50633]	10	10	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAS GTPASE-ACTIVATING- LIKE PROTEIN IQGAP1. [MASS=196522]
9	9	Rattus norvegicus (Rat) SPLICE ISOFORM LONG OF HYALURONAN AND PROTEOGLYCAN LINK PROTEIN 1 PRECURSOR. [MASS=40262]	8	8	Rattus norvegicus (Rat) CADHERIN-6 PRECURSOR. [MASS=88341]	8	9	Rattus norvegicus (Rat) CADHERIN-6 PRECURSOR. [MASS=88341]	10	11	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO UBIQUITIN CARBOXYL- TERMINAL HYDROLASE 5. [MASS=95779]
8	32	Rattus norvegicus (Rat) TRANSTHYRETIN PRECURSOR. [MASS=15720]	8	10	Rattus norvegicus (Rat) ECTONUCLEOTIDE PYROPHOSPHATASE/P HOSPHODIESTERASE 2. [MASS=101310]	7	9	Rattus norvegicus (Rat) TUBULIN BETA-5 CHAIN. [MASS=49671]	10	12	Rattus norvegicus (Rat) PREDICTED: AMINOPEPTIDASE PUROMYCIN SENSITIVE. [MASS=103344]
8	8	Rattus norvegicus (Rat) ISCHEMIA RESPONSIVE 94 KDA PROTEIN. [MASS=94057]	8	10	Rattus norvegicus (Rat) PROMININ-1S1 SPLICE VARIANT. [MASS=96632]	7	8	Rattus norvegicus (Rat) ANGIOTENSINOGEN PRECURSOR. [MASS=51982]	10	10	Rattus norvegicus (Rat) COATOMER SUBUNIT BETA. [MASS=107011]
8	12	Rattus norvegicus (Rat) NEURAL-CADHERIN PRECURSOR. [MASS=99686]	8	9	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF AGRIN PRECURSOR. [MASS=208646]	7	8	Rattus norvegicus (Rat) SPARC-LIKE PROTEIN 1 PRECURSOR. [MASS=70634]	10	13	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF AGRIN PRECURSOR. [MASS=208646]
8	15	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 3 PRECURSOR. [MASS=46277]	8	20	Rattus norvegicus (Rat) LOC367586 PROTEIN- Immunoglobulin Gamma heavy Chain. [MASS=50949]	7	7	Rattus norvegicus (Rat) Neogenin precursor. [MASS=156144]	10	14	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GAMMA-FILAMIN. [MASS=290986]
8	10	Rattus norvegicus (Rat) LUMICAN PRECURSOR. [MASS=38279]	8	10	Rattus norvegicus (Rat) VIMENTIN. [MASS=53602]	7	16	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 3 PRECURSOR. [MASS=46277]	10	10	Rattus norvegicus (Rat) 284 KDA PROTEIN. [MASS=284430]
8	8	Rattus norvegicus (Rat) PREDICTED: MINI CHROMOSOME MAINTENANCE DEFICIENT 6. [MASS=92815]	7	12	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 3 PRECURSOR. [MASS=46277]	7	9	Rattus norvegicus (Rat) ACTIN ALPHA SKELETAL MUSCLE. [MASS=42051]	9	18	Rattus norvegicus (Rat) TUBULIN BETA-5 CHAIN. [MASS=49671]

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8	11	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE G, MEMBER 1. [MASS=55611]	7	9	Rattus norvegicus (Rat) PREDICTED: NIDOGEN 2. [MASS=173960]	7	9	Rattus norvegicus (Rat) ELONGATION FACTOR 1-ALPHA 1. [MASS=50114]	9	11	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE G, MEMBER 1. [MASS=55611]
8	10	Rattus norvegicus (Rat) PREDICTED: LAMININ GAMMA 1. [MASS=177387]	7	8	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF REELIN PRECURSOR. [MASS=387531]	7	7	Rattus norvegicus (Rat) TRANSITIONAL ENDOPLASMIC RETICULUM ATPASE. [MASS=89534]	9	10	Rattus norvegicus (Rat) 170 KDA PROTEIN-Glutamyl-prolyl-tRNA synthetase. [MASS=170088]
8	8	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RNA HELICASE A. [MASS=150362]	7	7	Rattus norvegicus (Rat) PREDICTED: TRANSFORMING GROWTH FACTOR, BETA INDUCED, 68 KDA. [MASS=74369]	7	11	Rattus norvegicus (Rat) COLLAGEN ALPHA-2(I) CHAIN PRECURSOR. [MASS=129564]	9	10	Rattus norvegicus (Rat) PROTEASOME (PROSOME, MACROPAIN) 26S SUBUNIT, NON-ATPASE, 2. [MASS=100188]
8	11	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CADHERIN-5. [MASS=135230]	7	10	Rattus norvegicus (Rat) SERINE/CYSTEINE PROTEINASE INHIBITOR, CLADE C, MEMBER 1. [MASS=52234]	7	7	Rattus norvegicus (Rat) ALPHA-MANNOSIDASE 2. [MASS=131242]	9	10	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RNA HELICASE A. [MASS=150362]
8	12	Rattus norvegicus (Rat) EPSILON 1 GLOBIN. [MASS=16105]	7	7	Rattus norvegicus (Rat) IKAP. [MASS=149171]	7	9	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ATTRACTIN PRECURSOR. [MASS=163296]	9	9	Rattus norvegicus (Rat) DELETED IN COLORECTAL CANCER. [MASS=158142]
8	8	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO METHIONINE-TRNA SYNTHETASE. [MASS=101582]	7	8	Rattus norvegicus (Rat) DELETED IN COLORECTAL CANCER. [MASS=158142]	6	9	Rattus norvegicus (Rat) TUBULIN ALPHA-1 CHAIN. [MASS=50136]	9	10	Rattus norvegicus (Rat) ALPHA-MANNOSIDASE 2. [MASS=131242]
8	8	Rattus norvegicus (Rat) EXPORTIN-1. [MASS=123335]	7	7	Rattus norvegicus (Rat) COMPLEMENT C4 PRECURSOR. [MASS=192163]	6	6	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 6 PRECURSOR. [MASS=46652]	8	13	Rattus norvegicus (Rat) VITAMIN D-BINDING PROTEIN PRECURSOR. [MASS=53544]

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8	12	Rattus norvegicus (Rat) LOC367586 PROTEIN- Immunoglobulin Gamma heavy Chain. [IMASS=50949]	7	13	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN RGD1305887- TUBULIN BETA CHAIN. [IMASS=50059]	6	8	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR. [IMASS=133912]	8	11	Rattus norvegicus (Rat) IRON- RESPONSIVE ELEMENT- BINDING PROTEIN 1. [IMASS=98128]
8	8	Rattus norvegicus (Rat) PREDICTED: AMINOPEPTIDASE PUROMYCIN SENSITIVE. [IMASS=103344]	7	12	Rattus norvegicus (Rat) SP120-Heterogeneous nuclear ribonucleoprotein U. [IMASS=87748]	6	7	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RIKEN CDNA B430218L07 GENE. [IMASS=143906]	8	8	Rattus norvegicus (Rat) ALPHA-2 ANTIPLASMIN. [IMASS=46465]
8	9	Rattus norvegicus (Rat) PREDICTED: similar to I- complex protein 1 subunit theta. [IMASS=59745]	7	7	Rattus norvegicus (Rat) COLLAGEN ALPHA-2(I) CHAIN PRECURSOR. [IMASS=129564]	6	6	Rattus norvegicus (Rat) PREDICTED: TRANSFORMING GROWTH FACTOR, BETA INDUCED, 68 KDA. [IMASS=74369]	8	13	Rattus norvegicus (Rat) SP120- Heterogeneous nuclear ribonucleoprotein U. [IMASS=87748]
8	8	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN B. [IMASS=291469]	7	7	Rattus norvegicus (Rat) PREDICTED: similar to I- complex protein 1 subunit theta. [IMASS=59745]	6	8	Rattus norvegicus (Rat) ALPHA-2-GLOBIN CHAIN. [IMASS=15285]	8	8	Rattus norvegicus (Rat) PREDICTED: MINI CHROMOSOME MAINTENANCE DEFICIENT 6. [IMASS=92815]
8	8	Rattus norvegicus (Rat) STAPHYLOCOCCAL NUCLEASE DOMAIN- CONTAINING PROTEIN 1. [IMASS=101952]	6	8	Rattus norvegicus (Rat) CATHEPSIN B PRECURSOR. [IMASS=37470]	6	6	Rattus norvegicus (Rat) ARCADLIN. [IMASS=103800]	8	9	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FIBULIN-1 PRECURSOR. [IMASS=78072]
8	9	Rattus norvegicus (Rat) SPLICE ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR (FRAGMENT). [IMASS=300008]	6	8	Rattus norvegicus (Rat) ANGIOTENSINOGEN PRECURSOR. [IMASS=51982]	6	9	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [IMASS=62473]	8	8	Rattus norvegicus (Rat) STAPHYLOCOCCAL NUCLEASE DOMAIN- CONTAINING PROTEIN 1. [IMASS=101952]
8	14	Rattus norvegicus (Rat) FETUB PROTEIN. [IMASS=43169]	6	7	Rattus norvegicus (Rat) RAT T-KININOGEN. [IMASS=47618]	6	12	Rattus norvegicus (Rat) PREDICTED: RETINOL BINDING PROTEIN 4, PLASMA. [IMASS=50139]	8	13	Rattus norvegicus (Rat) APOLIPOPROTEIN E PRECURSOR. [IMASS=35753]
8	8	Rattus norvegicus (Rat) DAI-24-Complement Factor B. [IMASS=124379]	6	6	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [IMASS=62473]	6	10	Rattus norvegicus (Rat) PREDICTED: CALSYNTENIN 1. [IMASS=109351]	8	8	Rattus norvegicus (Rat) PREDICTED: BRAIN GLYCOGEN PHOSPHORYLASE. [IMASS=96738]

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7	9	<u>Rattus norvegicus (Rat)</u> <u>RAT T-KININOGEN</u> [MASS=47618]	6	8	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 1 OF</u> <u>ATTRACTIN</u> <u>PRECURSOR</u> [MASS=163296]	6	7	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 1 OF</u> <u>ALPHA-1B-</u> <u>GLYCOPROTEIN</u> <u>PRECURSOR</u> [MASS=56479]	8	23	<u>Rattus norvegicus (Rat)</u> <u>PLASMINOGEN</u> <u>PRECURSOR</u> [MASS=90536]
7	9	<u>Rattus norvegicus (Rat)</u> <u>SERINE/CYSTEINE</u> <u>PROTEINASE</u> <u>INHIBITOR, CLADE C,</u> <u>MEMBER 1,</u> [MASS=52234]	6	7	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO RIKEN CDNA</u> <u>B430218L07 GENE,</u> [MASS=143906]	6	8	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: NIDOGN</u> <u>2</u> [MASS=173960]	8	8	<u>Rattus norvegicus (Rat)</u> IKAP. [MASS=149171]
7	8	<u>Rattus norvegicus (Rat)</u> <u>CLIP-ASSOCIATING</u> <u>PROTEIN 2,</u> [MASS=140638]	6	7	<u>Rattus norvegicus (Rat)</u> <u>PROFILIN-1,</u> [MASS=14826]	6	7	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO PYRUVATE KINASE</u> <u>(EC 2.7.1.40) ISOZYME</u> <u>M2 - RAT</u> [MASS=57731]	8	9	<u>Rattus norvegicus (Rat)</u> <u>MANNOSE 6-</u> <u>PHOSPHATE/INSULIN-LIKE</u> <u>GROWTH FACTOR II</u> <u>RECEPTOR</u> [MASS=273608]
7	9	<u>Rattus norvegicus (Rat)</u> <u>RIBONUCLEOTIDE</u> <u>REDUCTASE M1,</u> [MASS=90293]	6	9	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: CADHERIN</u> <u>11</u> [MASS=88036]	6	7	<u>Rattus norvegicus (Rat)</u> <u>RAT T-KININOGEN,</u> [MASS=47618]	7	11	<u>Rattus norvegicus (Rat)</u> <u>CREATINE KINASE B-TYPE,</u> [MASS=42712]
7	7	<u>Rattus norvegicus (Rat)</u> <u>ECTONUCLEOTIDE</u> <u>PYROPHOSPHATASE/P</u> <u>HOSPHODIESTERASE 2,</u> [MASS=101310]	6	10	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM</u> <u>GAMMA-B OF</u> <u>FIBRINOGEN GAMMA</u> <u>CHAIN PRECURSOR,</u> [MASS=50633]	6	10	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: CADHERIN</u> <u>11</u> [MASS=88036]	7	13	<u>Rattus norvegicus (Rat)</u> <u>HYPOTHETICAL PROTEIN</u> <u>RGD1305887-TUBULIN BETA</u> <u>CHAIN</u> [MASS=50059]
7	8	<u>Rattus norvegicus (Rat)</u> <u>HEPHAESTIN</u> <u>PRECURSOR,</u> [MASS=129593]	6	12	<u>Rattus norvegicus (Rat)</u> <u>ELONGATION FACTOR</u> <u>1-ALPHA 1,</u> [MASS=50114]	6	6	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: TUMOR</u> <u>REJECTION ANTIGEN</u> <u>GP96</u> [MASS=92771]	7	8	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: similar to</u> <u>phosphoribosylformylglycinamid</u> <u>ine synthase</u> [MASS=146178]
7	7	<u>Rattus norvegicus (Rat)</u> <u>NONOIP54NRB</u> <u>HOMOLOG,</u> [MASS=75487]	6	8	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO CRB2 PROTEIN,</u> [MASS=138781]	6	8	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO STABILIN-1,</u> [MASS=288663]	7	12	<u>Rattus norvegicus (Rat)</u> ATP- <u>CITRATE SYNTHASE,</u> [MASS=120781]
7	14	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED:</u> <u>MICROTUBULE-</u> <u>ASSOCIATED PROTEIN</u> <u>1B</u> [MASS=269643]	6	6	<u>Rattus norvegicus (Rat)</u> <u>TRIPEPTIDYL-</u> <u>PEPTIDASE 2,</u> [MASS=138162]	6	7	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO HEMICENTIN 1,</u> [MASS=639647]	7	10	<u>Rattus norvegicus (Rat)</u> <u>ANGIOTENSINOGEN</u> <u>PRECURSOR</u> [MASS=51982]

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7	7	Rattus norvegicus (Rat) PREDICTED: NUCLEOLIN-RELATED PROTEIN NRP. [MASS=57036]	6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CAD PROTEIN. [MASS=250725]	6	7	Rattus norvegicus (Rat) COMPLEMENT COMPONENT 2. [MASS=83699]	7	10	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CADHERIN-5. [MASS=135230]
7	8	Rattus norvegicus (Rat) NESTIN. [MASS=208797]	6	7	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RNA HELICASE A. [MASS=150362]	6	9	Rattus norvegicus (Rat) FETUB PROTEIN. [MASS=43169]	7	12	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PHOSPHOLIPID TRANSFER PROTEIN. [MASS=65430]
7	7	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF AGRN PRECURSOR. [MASS=208646]	5	8	Rattus norvegicus (Rat) CREATINE KINASE B- TYPE. [MASS=42712]	5	6	Rattus norvegicus (Rat) PROFILIN-1. [MASS=14826]	7	7	Rattus norvegicus (Rat) SEZ6B. [MASS=105607]
7	8	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 2. [MASS=139673]	5	5	Rattus norvegicus (Rat) PHOSPHOGLYCERATE KINASE 1. [MASS=44423]	5	9	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 1 PRECURSOR. [MASS=46562]	7	8	Rattus norvegicus (Rat) DYNACTIN-1. [MASS=141930]
6	10	Rattus norvegicus (Rat) CREATINE KINASE B- TYPE. [MASS=42712]	5	5	Rattus norvegicus (Rat) HEAT SHOCK COGNATE 71 KDA PROTEIN. [MASS=70871]	5	5	Rattus norvegicus (Rat) PROPROTEIN CONVERTASE SUBTILISIN/KEXIN TYPE 9 PRECURSOR. [MASS=74709]	7	8	Rattus norvegicus (Rat) INTER- ALPHA-INHIBITOR H4 HEAVY CHAIN. [MASS=103755]
6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SPLICING FACTOR 3B. SUBUNIT 3. 130KDA. [MASS=174174]	5	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROGRAMMED CELL DEATH 6 INTERACTING PROTEIN. [MASS=75806]	5	5	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN LOC314432- Similar to ubiquitin-protein ligase (EC 6.3.2.19) E1. [MASS=117788]	7	7	Rattus norvegicus (Rat) SPECTRIN ALPHA CHAIN. BRAIN. [MASS=284713]
6	8	Rattus norvegicus (Rat) GLUCOSE PHOSPHATE ISOMERASE. [MASS=62827]	5	5	Rattus norvegicus (Rat) FIBRINOGEN BETA CHAIN PRECURSOR. [MASS=54303]	5	12	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE F, MEMBER 2. [MASS=54893]	7	10	Rattus norvegicus (Rat) ELONGATION FACTOR 1- ALPHA 1. [MASS=50114]
6	11	Rattus norvegicus (Rat) CONTRAPSIN-LIKE PROTEASE INHIBITOR 1 PRECURSOR. [MASS=46562]	5	5	Rattus norvegicus (Rat) ATP-CITRATE SYNTHASE. [MASS=120781]	5	8	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(V) CHAIN PRECURSOR. [MASS=184610]	7	7	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VERY LARGE G PROTEIN- COUPLED RECEPTOR 1. [MASS=413840]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
6	9	Rattus norvegicus (Rat) PLASMINOGEN PRECURSOR. [MASS=90536]	5	5	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR. [MASS=133912]	5	5	Rattus norvegicus (Rat) COMPLEMENT C4 PRECURSOR. [MASS=192163]	7	7	Rattus norvegicus (Rat) PROTEIN KINASE C-BINDING PROTEIN NELL2. [MASS=91334]
6	7	Rattus norvegicus (Rat) Inter-alpha trypsin inhibitor, heavy chain 3. [MASS=98968]	5	11	Rattus norvegicus (Rat) CYSTATIN C PRECURSOR. [MASS=15437]	5	7	Rattus norvegicus (Rat) GLUTATHIONE PEROXIDASE 3 PRECURSOR. [MASS=25393]	7	9	Rattus norvegicus (Rat) COMPLEMENT INHIBITORY FACTOR H. [MASS=140344]
6	7	Rattus norvegicus (Rat) LEUCYL-TRNA SYNTHETASE. [MASS=134279]	5	7	Rattus norvegicus (Rat) PEROXIREDOXIN-2. [MASS=21652]	5	8	Rattus norvegicus (Rat) FIBRILLIN-2. [MASS=313374]	7	8	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EUKARYOTIC TRANSLATION INITIATION FACTOR 3. SUBUNIT 10 THETA. 150/170KDA. [MASS=192616]
6	7	Rattus norvegicus (Rat) ALPHA-2-GLOBIN CHAIN. [MASS=15285]	5	10	Rattus norvegicus (Rat) ACTIN, CYTOPLASMIC 1. [MASS=41737]	5	6	Rattus norvegicus (Rat) SPLICE ISOFORM APP770 OF AMYLOID BETA A4 PROTEIN PRECURSOR. (FRAGMENT). [MASS=86704]	6	7	Rattus norvegicus (Rat) ACTIN. CYTOPLASMIC 1. [MASS=41737]
6	6	Rattus norvegicus (Rat) CC2-27. [MASS=120523]	5	5	Rattus norvegicus (Rat) TRIOSEPHOSPHATE ISOMERASE. [MASS=26790]	5	7	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN RGD1305887- TUBULIN BETA CHAIN. [MASS=50059]	6	9	Rattus norvegicus (Rat) LUMICAN PRECURSOR. [MASS=38279]
6	6	Rattus norvegicus (Rat) PREDICTED: TUMOR REJECTION ANTIGEN GP96. [MASS=92771]	5	5	Rattus norvegicus (Rat) LEUCYL-TRNA SYNTHETASE. [MASS=134279]	5	6	Rattus norvegicus (Rat) QUIESCIN Q6. [MASS=82412]	6	6	Rattus norvegicus (Rat) PREDICTED C-1- TETRAHYDROFOLATE SYNTHASE. CYTOPLASMIC. [MASS=100351]
6	11	Rattus norvegicus (Rat) PREDICTED: RETINOL BINDING PROTEIN 4. PLASMA. [MASS=50139]	5	8	Rattus norvegicus (Rat) SPLICE ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR (FRAGMENT). [MASS=300008]	5	5	Rattus norvegicus (Rat) Inter-alpha trypsin inhibitor, heavy chain 3. [MASS=98968]	6	6	Rattus norvegicus (Rat) VESICLE ASSOCIATED PROTEIN. [MASS=135350]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
6	7	Rattus norvegicus (Rat) PREDICTED: TRIPARTITE MOTIF PROTEIN 28. [MASS=108785]	5	5	Rattus norvegicus (Rat) GAMMA-GLUTAMYL HYDROLASE PRECURSOR. [MASS=35830]	5	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PHOSPHOLIPID TRANSFER PROTEIN. [MASS=65430]	6	6	Rattus norvegicus (Rat) HEAT SHOCK COGNATE 71 KDA PROTEIN. [MASS=70871]
6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CELLULAR APOPTOSIS SUSCEPTIBILITY PROTEIN. [MASS=110214]	5	13	Rattus norvegicus (Rat) PREDICTED: RETINOL BINDING PROTEIN 4. PLASMA. [MASS=50139]	5	7	Rattus norvegicus (Rat) PREDICTED: HYPOTHETICAL PROTEIN XP_344107. [MASS=189275]	6	8	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN HSP 90- BETA. [MASS=83185]
6	9	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(I) CHAIN PRECURSOR. [MASS=137886]	5	5	Rattus norvegicus (Rat) PROTEIN KINASE C- BINDING PROTEIN NELL2. [MASS=91334]	5	5	Rattus norvegicus (Rat) ALPHA-1- MACROGLOBULIN. [MASS=167125]	6	6	Rattus norvegicus (Rat) MATRIN-3. [MASS=94447]
6	7	Rattus norvegicus (Rat) ANGIOTENSINOGEN PRECURSOR. [MASS=51982]	5	5	Rattus norvegicus (Rat) PREDICTED: TYROSINE KINASE RECEPTOR 1. [MASS=125210]	5	5	Rattus norvegicus (Rat) PREDICTED: TYROSINE KINASE RECEPTOR 1. [MASS=125210]	6	6	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF REELIN PRECURSOR. [MASS=387531]
6	12	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF ALPHA-1B- GLYCOPROTEIN PRECURSOR. [MASS=56479]	5	5	Rattus norvegicus (Rat) CHAPERONIN CONTAINING TCP1 SUBUNIT 2. [MASS=57458]	5	26	Rattus norvegicus (Rat) EXTRACELLULAR SUPEROXIDE DISMUTASE [CU-ZN] PRECURSOR. [MASS=26620]	6	6	Rattus norvegicus (Rat) PROMININ-1S1 SPLICE VARIANT. [MASS=96632]
6	6	Rattus norvegicus (Rat) VALYL-TRNA SYNTHETASE. [MASS=141275]	5	5	Rattus norvegicus (Rat) ALPHA-1- MACROGLOBULIN. [MASS=167125]	5	11	Rattus norvegicus (Rat) PEPTIDYLPROLYL ISOMERASE C. [MASS=23009]	6	7	Rattus norvegicus (Rat) CHLORIDE INTRACELLULAR CHANNEL 6. [MASS=64786]
6	7	Rattus norvegicus (Rat) CHAPERONIN CONTAINING TCP1 SUBUNIT 2. [MASS=57458]	5	5	Rattus norvegicus (Rat) Inter-alpha trypsin inhibitor heavy chain 3. [MASS=98968]	5	6	Rattus norvegicus (Rat) PROTEIN KINASE C- BINDING PROTEIN NELL2. [MASS=91334]	6	6	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR. [MASS=133912]
6	6	Rattus norvegicus (Rat) CHAPERONIN CONTAINING TCP1 SUBUNIT 5. [MASS=59537]	5	6	Rattus norvegicus (Rat) SPICE ISOFORM LONG OF HYALURONAN AND PROTEOGLYCAN LINK PROTEIN 1 PRECURSOR. [MASS=40262]	4	7	Rattus norvegicus (Rat) PREDICTED: DYSTROGLYCAN 1. [MASS=96706]	6	6	Rattus norvegicus (Rat) VASCULAR CELL ADHESION PROTEIN 1 PRECURSOR. [MASS=81246]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
6	9	Rattus norvegicus (Rat) CORTICOSTEROID- BINDING GLOBULIN PRECURSOR. [MASS=44672]	5	5	Rattus norvegicus (Rat) PREDICTED: TRIPARTITE MOTIF PROTEIN 28. [MASS=108785]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEPATIC MULTIPLE INOSITOL POLYPHOSPHATE PHOSPHATASE. [MASS=54619]	6	7	Rattus norvegicus (Rat) PROTEIN CONVERTASE SUBTILISIN/KEXIN TYPE 9 PRECURSOR. [MASS=74709]
6	8	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L18. [MASS=21527]	5	5	Rattus norvegicus (Rat) STAPHYLOCOCCAL NUCLEASE DOMAIN- CONTAINING PROTEIN 1. [MASS=101952]	4	4	Rattus norvegicus (Rat) PROMININ-1S1 SPLICE VARIANT. [MASS=96632]	6	6	Rattus norvegicus (Rat) MAMA. [MASS=63772]
6	6	Rattus norvegicus (Rat) Neogenin precursor. [MASS=156144]	5	5	Rattus norvegicus (Rat) PREDICTED: MINI CHROMOSOME MAINTENANCE DEFICIENT 6. [MASS=92815]	4	5	Rattus norvegicus (Rat) EPSILON 3 GLOBIN. [MASS=16540]	6	6	Rattus norvegicus (Rat) TLN PROTEIN. [MASS=161978]
6	7	Rattus norvegicus (Rat) TRIPEPTIDYL- PEPTIDASE 2. [MASS=138162]	5	5	Rattus norvegicus (Rat) 170 KDA PROTEIN- Glutamyl-proM-IRNA synthetase. [MASS=170088]	4	9	Rattus norvegicus (Rat) CYSTATIN C PRECURSOR. [MASS=15437]	6	8	Rattus norvegicus (Rat) NESTIN. [MASS=208797]
6	7	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ B1. [MASS=228429]	5	5	Rattus norvegicus (Rat) MYOSIN-10. [MASS=228965]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PTK7 PROTEIN TYROSINE KINASE 7. [MASS=139818]	6	8	Rattus norvegicus (Rat) ALPHA-2-GLOBIN CHAIN. [MASS=15285]
6	8	Rattus norvegicus (Rat) MANNOSE 6- PHOSPHATE/INSULIN- LIKE GROWTH FACTOR II RECEPTOR. [MASS=273608]	5	5	Rattus norvegicus (Rat) ALPHA-MANNOSIDASE 2. [MASS=131242]	4	5	Rattus norvegicus (Rat) GRP78 BINDING PROTEIN. [MASS=110574]	6	12	Rattus norvegicus (Rat) PREDICTED: NEURAL PRECURSOR CELL EXPRESSED DEVELOPMENTALLY DOWN- REGULATED GENE 4A. [MASS=112368]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SMC2 PROTEIN. [MASS=134280]	5	5	Rattus norvegicus (Rat) PREDICTED: NEURAL PRECURSOR CELL EXPRESSED. DEVELOPMENTALLY DOWN-REGULATED GENE 4A. [MASS=112368]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 18 PRECURSOR. [MASS=123552]	6	7	Rattus norvegicus (Rat) 14-3-3 PROTEIN EPSILON. [MASS=29174]
6	6	Rattus norvegicus (Rat) 14-3-3 PROTEIN EPSILON. [MASS=29174]	5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GCN1 GENERAL CONTROL OF AMINO- ACID SYNTHESIS 1- LIKE 1. [MASS=302942]	4	4	Rattus norvegicus (Rat) M-CADHERIN. [MASS=85753]	6	7	Rattus norvegicus (Rat) MICROTUBULE-ASSOCIATED PROTEIN 4. [MASS=110301]
6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COATOMER PROTEIN COMPLEX SUBUNIT ALPHA. [MASS=138360]	4	7	Rattus norvegicus (Rat) PREDICTED: DYSTROGLYCAN 1. [MASS=96706]	4	16	Rattus norvegicus (Rat) PREDICTED: similar to Fibulin-1 precursor. [MASS=75381]	6	6	Rattus norvegicus (Rat) FAR UPSTREAM ELEMENT- BINDING PROTEIN 2. [MASS=74226]
6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CHROMATIN- SPECIFIC TRANSCRIPTION ELONGATION FACTOR, 140 KDA SUBUNIT. [MASS=130435]	4	5	Rattus norvegicus (Rat) 14-3-3 PROTEIN ZETADELTA. [MASS=27771]	4	4	Rattus norvegicus (Rat) AFAMIN PRECURSOR. [MASS=69335]	6	6	Rattus norvegicus (Rat) JUNCTION PLAKOGLOBIN. [MASS=81801]
6	6	Rattus norvegicus (Rat) PREDICTED: KINESIN FAMILY MEMBER 4. [MASS=139682]	4	4	Rattus norvegicus (Rat) GLUCOSE PHOSPHATE ISOMERASE. [MASS=62827]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEMA6A PROTEIN. [MASS=114583]	6	6	Rattus norvegicus (Rat) PREDICTED: similar to I- complex protein 1 subunit theta. [MASS=59745]
5	8	Rattus norvegicus (Rat) ACTIN, CYTOPLASMIC 1. [MASS=41737]	4	5	Rattus norvegicus (Rat) EPSILON 1 GLOBIN. [MASS=16105]	4	7	Rattus norvegicus (Rat) SPLICE ISOFORM V0 OF VERSICAN CORE PROTEIN PRECURSOR (FRAGMENT). [MASS=300008]	6	9	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE F, MEMBER 2. [MASS=54893]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
5	5	Rattus norvegicus (Rat) PREDICTED similar to C- 1-TETRAHYDROFOLATE SYNTHASE, CYTOPLASMIC. [MASS=100351]	4	4	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR. [MASS=86686]	4	5	Rattus norvegicus (Rat) PROTOCOLADHERIN GAMMA SUBFAMILY C, 3. [MASS=101038]	6	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ISOLEUCINE-TRNA SYNTHETASE. [MASS=144169]
5	8	Rattus norvegicus (Rat) CATHESPIN B PRECURSOR. [MASS=37470]	4	4	Rattus norvegicus (Rat) PREDICTED: similar to Heterogeneous nuclear ribonucleoproteins A2/B1. [MASS=32468]	4	4	Rattus norvegicus (Rat) SORTILIN PRECURSOR. [MASS=91169]	6	6	Rattus norvegicus (Rat) VALYL- TRNA SYNTHETASE. [MASS=141275]
5	6	Rattus norvegicus (Rat) PROTEASOME (PROSOME) MACROPAIN 26S SUBUNIT, NON-ATPASE, 2. [MASS=100188]	4	6	Rattus norvegicus (Rat) ALPHA-2-GLOBIN CHAIN. [MASS=15285]	4	4	Rattus norvegicus (Rat) ISCHEMIA RESPONSIVE 94 KDA PROTEIN. [MASS=94057]	6	15	Rattus norvegicus (Rat) SPLICE ISOFORM HMW OF KININOGEN-1 PRECURSOR. [MASS=70933]
5	7	Rattus norvegicus (Rat) PREDICTED: CADHERIN 11. [MASS=88036]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5. [MASS=99947]	4	4	Rattus norvegicus (Rat) MANNNOSE 6- PHOSPHATE/INSULIN- LIKE GROWTH FACTOR II RECEPTOR. [MASS=273608]	5	6	Rattus norvegicus (Rat) 14-3-3 PROTEIN ZETA/DELTA. [MASS=27771]
5	6	Rattus norvegicus (Rat) RAB GDP DISSOCIATION INHIBITOR BETA. [MASS=50685]	4	4	Rattus norvegicus (Rat) PEPTIDYL-PROLYL CIS- TRANS ISOMERASE A. [MASS=17743]	4	4	Rattus norvegicus (Rat) PROCOLLAGEN- LYSINE 2- OXOGLUTARATE 5- DIOXYGENASE 3 PRECURSOR. [MASS=85060]	5	5	Rattus norvegicus (Rat) PREDICTED NUCLEOLIN- RELATED PROTEIN NRP. [MASS=57036]
5	5	Rattus norvegicus (Rat) PREDICTED similar to Nuclear autoantigenic sperm protein. [MASS=45764]	4	4	Rattus norvegicus (Rat) L- LACTATE DEHYDROGENASE A CHAIN. [MASS=36451]	4	5	Rattus norvegicus (Rat) COMPLEMENT INHIBITORY FACTOR H. [MASS=140344]	5	6	Rattus norvegicus (Rat) PHOSPHOGLYCERATE KINASE 1. [MASS=44423]
5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RIKEN CDNA B430218L07 GENE. [MASS=143906]	4	8	Rattus norvegicus (Rat) PREDICTED: similar to Fibulin-1 precursor. [MASS=75381]	4	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ-2 ALPHA2 CHAIN PRECURSOR. [MASS=359007]	5	7	Rattus norvegicus (Rat) COLLAGEN TYPE A1(X)17-8. [MASS=45691]

# of unique peptides from protein	Total # peptides	Protein matches E12.5	# of unique peptides from protein	Total # peptides	Protein matches E14 LV	# of unique peptides from protein	Total number of peptides	Protein matches E14 4thV	# of unique peptides from protein	Total # of peptides	Protein matches E17.5 LV
5	5	Rattus norvegicus (Rat) LAR RECEPTOR-LINKED TYROSINE PHOSPHATASE. [MASS=181130]	4	4	Rattus norvegicus (Rat) PROTEASOME (PROSOME, MACROPAIN) 26S SUBUNIT, NON-ATPASE. 2. [MASS=100188]	4	6	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [MASS=67815]	5	6	Rattus norvegicus (Rat) RAT T-KININOGEN. [MASS=47618]
5	7	Rattus norvegicus (Rat) SPLICE ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR. [MASS=50633]	4	4	Rattus norvegicus (Rat) AFAMIN PRECURSOR. [MASS=69335]	4	6	Rattus norvegicus (Rat) FIBULIN-2 ISOFORM A. [MASS=126193]	5	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO IMPORTIN 9. [MASS=131739]
5	5	Rattus norvegicus (Rat) ADENOSYLHOMOCYSTEINASE. [MASS=47407]	4	5	Rattus norvegicus (Rat) SPARC-LIKE PROTEIN 1 PRECURSOR. [MASS=70634]	4	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLLAGEN ALPHA1 TYPE VI PRECURSOR. [MASS=130760]	5	6	Rattus norvegicus (Rat) COMPLEMENT C4 PRECURSOR. [MASS=192163]
5	5	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF PROTEIN SET. [MASS=33406]	4	10	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE F, MEMBER 2. [MASS=54893]	4	5	Rattus norvegicus (Rat) PROTHROMBIN PRECURSOR (FRAGMENT). [MASS=70412]	5	6	Rattus norvegicus (Rat) NONOIP54NRB HOMOLOG. [MASS=75487]
5	5	Rattus norvegicus (Rat) IRON-RESPONSIVE ELEMENT-BINDING PROTEIN 1. [MASS=98128]	4	5	Rattus norvegicus (Rat) SORTILIN PRECURSOR. [MASS=91169]	4	5	Rattus norvegicus (Rat) TRANSOBALAMIN 2 PRECURSOR. [MASS=47420]	5	5	Rattus norvegicus (Rat) KALLISTATIN. [MASS=48021]
5	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EUKARYOTIC TRANSLATION INITIATION FACTOR 3, SUBUNIT 10 THETA, 150/170KDA. [MASS=192616]	4	4	Rattus norvegicus (Rat) PREDICTED: AMINOPEPTIDASE PUROMYCIN SENSITIVE. [MASS=103344]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VINCULIN. [MASS=116615]	5	6	Rattus norvegicus (Rat) EXPORTIN-1. [MASS=123335]
5	9	Rattus norvegicus (Rat) SERINE PEPTIDASE INHIBITOR, CLADE F, MEMBER 2. [MASS=54893]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 1 ISOFORM 2 PRECURSOR. [MASS=138914]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PLEXIN-B2 PRECURSOR. [MASS=216119]	5	8	Rattus norvegicus (Rat) PREDICTED-INHIBIN BINDING PROTEIN LONG ISOFORM. [MASS=153224]

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5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEROTRANSFERRIN PRECURSOR. [MASS=76607]	4	4	Rattus norvegicus (Rat) EXPORTIN-1. [MASS=123335]	3	3	Rattus norvegicus (Rat) 14-3-3 PROTEIN ZETADELTA. [MASS=27771]	5	10	Rattus norvegicus (Rat) CATHEPSIN B PRECURSOR. [MASS=37470]
5	7	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(III) CHAIN PRECURSOR. [MASS=138936]	4	6	Rattus norvegicus (Rat) SPLICE ISOFORM HMW OF KININOGEN-1 PRECURSOR. [MASS=70933]	3	3	Rattus norvegicus (Rat) COLLAGEN TYPE A1(XI)7-8. [MASS=45691]	5	8	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5. [MASS=133476]
5	8	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [MASS=62473]	4	7	Rattus norvegicus (Rat) GLUTATHIONE PEROXIDASE 3 PRECURSOR. [MASS=25393]	3	3	Rattus norvegicus (Rat) PROTECTIVE PROTEIN FOR BETA-GALACTOSIDASE. [MASS=51216]	5	16	Rattus norvegicus (Rat) CYSTATIN C PRECURSOR. [MASS=15437]
5	7	Rattus norvegicus (Rat) NUCLEOSOME ASSEMBLY PROTEIN 1-LIKE 1. [MASS=45373]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PTK7 PROTEIN TYROSINE KINASE 7. [MASS=139818]	3	4	Rattus norvegicus (Rat) CREATINE KINASE B-TYPE. [MASS=42712]	5	7	Rattus norvegicus (Rat) LACTADHERIN PRECURSOR. [MASS=47413]
5	5	Rattus norvegicus (Rat) PREDICTED: VON WILLEBRAND FACTOR. [MASS=308474]	4	4	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF SEX HORMONE-BINDING GLOBULIN PRECURSOR. [MASS=44533]	3	3	Rattus norvegicus (Rat) PEROXIREDOXIN-2. [MASS=21652]	5	6	Rattus norvegicus (Rat) SPLICE ISOFORM GAMMA-B OF FIBRINOGEN GAMMA CHAIN PRECURSOR. [MASS=50633]
5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEPATIC MULTIPLE INOSITOL POLYPHOSPHATE PHOSPHATASE. [MASS=54619]	4	6	Rattus norvegicus (Rat) PEPTIDYLPROLYL ISOMERASE C. [MASS=23009]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 1 ISOFORM 2 PRECURSOR. [MASS=138914]	5	6	Rattus norvegicus (Rat) EPSILON 1 GLOBIN. [MASS=16105]
5	6	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN SA. [MASS=32693]	4	5	Rattus norvegicus (Rat) QUIESCIN Q6. [MASS=82412]	3	3	Rattus norvegicus (Rat) GAMMA-GLUTAMYL HYDROLASE PRECURSOR. [MASS=35630]	5	5	Rattus norvegicus (Rat) TRIPEPTIDYL-PEPTIDASE 2. [MASS=138162]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
5	5	Rattus norvegicus (Rat) TRIOSEPHOSPHATE ISOMERASE. [MASS=26790]	4	6	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN D0. [MASS=38192]	3	3	Rattus norvegicus (Rat) PREDICTED: similar to Silt-like 2. [MASS=72321]	5	7	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CRB2 PROTEIN. [MASS=138781]
5	6	Rattus norvegicus (Rat) HEMOPEXIN PRECURSOR. [MASS=51291]	4	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PHOSPHOLIPID TRANSFER PROTEIN. [MASS=65430]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CRB2 PROTEIN. [MASS=138781]	5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALANYL-TRNA SYNTHETASE. [MASS=106811]
5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CCTETA. ETA SUBUNIT OF THE CHAPERONIN CONTAINING TCP-1. [MASS=75684]	4	4	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=83185]	3	4	Rattus norvegicus (Rat) ACTIN. CYTOPLASMIC 1. [MASS=41737]	5	6	Rattus norvegicus (Rat) PREDICTED: MINI CHROMOSOME MAINTENANCE DEFICIENT 4 HOMOLOG. [MASS=96685]
5	7	Rattus norvegicus (Rat) PROFILIN-1. [MASS=14826]	4	6	Rattus norvegicus (Rat) LOW-DENSITY LIPOPROTEIN RECEPTOR PRECURSOR. [MASS=96622]	3	4	Rattus norvegicus (Rat) LOW-DENSITY LIPOPROTEIN RECEPTOR PRECURSOR. [MASS=96622]	5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VINCULIN. [MASS=116615]
5	6	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF NEURONAL CELL ADHESION MOLECULE PRECURSOR. [MASS=133912]	4	5	Rattus norvegicus (Rat) BETA-2-MICROGLOBULIN PRECURSOR. [MASS=13720]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LERK-5. [MASS=37282]	5	6	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF ATTRACTIN PRECURSOR. [MASS=163296]
5	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FRAS1 RELATED EXTRACELLULAR MATRIX PROTEIN 2. [MASS=378709]	4	5	Rattus norvegicus (Rat) FETUB PROTEIN. [MASS=43169]	3	4	Rattus norvegicus (Rat) HEPATOCYTE GROWTH FACTOR ACTIVATOR. [MASS=70737]	5	7	Rattus norvegicus (Rat) GLUCOSE PHOSPHATE ISOMERASE. [MASS=62827]
5	8	Rattus norvegicus (Rat) I-COMPLEX PROTEIN 1 SUBUNIT DELTA. [MASS=67968]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 18 PRECURSOR. [MASS=123552]	3	3	Rattus norvegicus (Rat) MANNOSIDASE 2, ALPHA B1. [MASS=114327]	5	6	Rattus norvegicus (Rat) SPICE ISOFORM 2 OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA PRECURSOR. [MASS=164596]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # peptide s	Protein matches E17.5 LV
5	6	Rattus norvegicus (Rat) <u>SPLICE ISOFORM HMW OF KININOGEN-1</u> PRECURSOR. [MASS=70933]	4	5	Rattus norvegicus (Rat) <u>COMPLEMENT COMPONENT 2</u> . [MASS=83699]	3	3	Rattus norvegicus (Rat) <u>NEUROFILIN-2</u> PRECURSOR. [MASS=104473]	5	5	Rattus norvegicus (Rat) <u>HEAT-SHOCK PROTEIN 105 KDA</u> . [MASS=96419]
5	8	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN L6</u> . [MASS=32944]	4	4	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO HEPATIC MULTIPLE INOSITOL POLYPHOSPHATE PHOSPHATASE</u> . [MASS=54619]	3	3	Rattus norvegicus (Rat) <u>PROCOLLAGEN C-ENDOPEPTIDASE ENHANCER 1</u> PRECURSOR. [MASS=50185]	5	7	Rattus norvegicus (Rat) <u>PREDICTED similar to Nuclear autoantigenic sperm protein</u> . [MASS=45764]
5	6	Rattus norvegicus (Rat) <u>60S RIBOSOMAL PROTEIN L4</u> . [MASS=47126]	4	4	Rattus norvegicus (Rat) <u>NESTIN</u> . [MASS=208797]	3	3	Rattus norvegicus (Rat) <u>FATTY ACID SYNTHASE</u> . [MASS=272650]	5	6	Rattus norvegicus (Rat) <u>LAR RECEPTOR-LINKED TYROSINE PHOSPHATASE</u> . [MASS=181130]
4	4	Rattus norvegicus (Rat) <u>IG KAPPA CHAIN C REGION, B ALLELE</u> . [MASS=11601]	4	4	Rattus norvegicus (Rat) <u>SPLICE ISOFORM 2 OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA</u> PRECURSOR. [MASS=164596]	3	4	Rattus norvegicus (Rat) <u>PEPTIDYL-PROLYL CIS-TRANS ISOMERASE A</u> . [MASS=17743]	4	5	Rattus norvegicus (Rat) <u>IG KAPPA CHAIN C REGION, B ALLELE</u> . [MASS=11601]
4	4	Rattus norvegicus (Rat) <u>EUKARYOTIC TRANSLATION INITIATION FACTOR 4A2</u> . [MASS=46489]	4	4	Rattus norvegicus (Rat) <u>CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1</u> . [MASS=136362]	3	3	Rattus norvegicus (Rat) <u>SPLICE ISOFORM 1 OF SEX HORMONE-BINDING GLOBULIN</u> PRECURSOR. [MASS=44533]	4	5	Rattus norvegicus (Rat) <u>CHAPERONIN CONTAINING TCP1, SUBUNIT 2</u> . [MASS=57458]
4	7	Rattus norvegicus (Rat) <u>HNRPK PROTEIN</u> . [MASS=51028]	4	4	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO PROTOCADHERIN 19</u> PRECURSOR. [MASS=125989]	3	4	Rattus norvegicus (Rat) <u>CELL GROWTH REGULATOR WITH EF HAND DOMAIN 1</u> . [MASS=30835]	4	4	Rattus norvegicus (Rat) <u>PREDICTED: TUMOR REJECTION ANTIGEN GP96</u> . [MASS=92771]
4	5	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5</u> . [MASS=133476]	4	9	Rattus norvegicus (Rat) <u>COLLAGEN ALPHA-1(III) CHAIN PRECURSOR</u> . [MASS=138936]	3	3	Rattus norvegicus (Rat) <u>ROUNDABOUT HOMOLOG 1</u> PRECURSOR. [MASS=180748]	4	4	Rattus norvegicus (Rat) <u>DREBRIN 1</u> . [MASS=77472]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
4	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5. [MASS=99947]	4	5	Rattus norvegicus (Rat) EPSILON 3 GLOBIN. [MASS=16540]	3	4	Rattus norvegicus (Rat) BETA-2-MICROGLOBULIN PRECURSOR. [MASS=13720]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DNA REPLICATION LICENSING FACTOR MCM3. [MASS=83429]
4	5	Rattus norvegicus (Rat) RATSG1. [MASS=49199]	4	5	Rattus norvegicus (Rat) MANNOSE 6-PHOSPHATE/INSULIN-LIKE GROWTH FACTOR II RECEPTOR. [MASS=273608]	3	6	Rattus norvegicus (Rat) FOLLISTATIN-RELATED PROTEIN 1 PRECURSOR. [MASS=34622]	4	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO IMPORTIN 7. [MASS=119704]
4	9	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=83185]	4	4	Rattus norvegicus (Rat) PREDICTED NUCLEOLIN-RELATED PROTEIN NRP. [MASS=57036]	3	3	Rattus norvegicus (Rat) CLUSTERIN PRECURSOR. [MASS=51375]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RANBP21. [MASS=136714]
4	6	Rattus norvegicus (Rat) PEPTIDYL-PROLYL CIS-TRANS ISOMERASE A. [MASS=17743]	4	4	Rattus norvegicus (Rat) DYNEIN HEAVY CHAIN CYTOSOLIC. [MASS=532252]	3	3	Rattus norvegicus (Rat) PROTEIN DISULFIDE-ISOMERASE PRECURSOR. [MASS=56951]	4	4	Rattus norvegicus (Rat) ALPHA-ACTININ-1. [MASS=102960]
4	6	Rattus norvegicus (Rat) PEROXIREDOXIN-2. [MASS=21652]	4	4	Rattus norvegicus (Rat) PEROXIREDOXIN-1. [MASS=22109]	3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO INTER-ALPHA-INHIBITOR H2 CHAIN. [MASS=105715]	4	4	Rattus norvegicus (Rat) ARCADLIN. [MASS=103800]
4	7	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN D0. [MASS=38192]	4	22	Rattus norvegicus (Rat) EXTRACELLULAR SUPEROXIDE DISMUTASE [CU-ZN] PRECURSOR. [MASS=26620]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ELASTIN MICROFIBRIL INTERFACER 1. [MASS=107560]	4	4	Rattus norvegicus (Rat) PROTOCADHERIN GAMMA SUBFAMILY C.3. [MASS=101038]
4	4	Rattus norvegicus (Rat) PREDICTED: similar to Heterogeneous nuclear ribonucleoproteins A2/B1. [MASS=32468]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN A. [MASS=290169]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA 2 TYPE VI COLLAGEN ISOFORM 2C2A PRECURSOR. [MASS=98272]	4	4	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A. ISOFORM 1. [MASS=46154]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
4	4	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S3A. [MASS=29814]	4	5	Rattus norvegicus (Rat) COMPLEMENT INHIBITORY FACTOR H. [MASS=140344]	3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLLAGEN ALPHA 2(IV) CHAIN PRECURSOR - MOUSE. [MASS=192535]	4	4	Rattus norvegicus (Rat) RIBONUCLEOTIDE REDUCTASE M1. [MASS=90293]
4	4	Rattus norvegicus (Rat) TXNRD1 PROTEIN. [MASS=63002]	4	4	Rattus norvegicus (Rat) PREDICTED: KINESIN FAMILY MEMBER 4. [MASS=139682]	3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF NEUROFASCIN PRECURSOR. [MASS=138004]	4	7	Rattus norvegicus (Rat) PREDICTED: RETINOL BINDING PROTEIN 4. PLASMA. [MASS=50139]
4	5	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A. ISOFORM 1. [MASS=46154]	4	4	Rattus norvegicus (Rat) CELL GROWTH REGULATOR WITH EF HAND DOMAIN 1. [MASS=30835]	3	3	Rattus norvegicus (Rat) SERINE (OR CYSTEINE) PROTEINASE INHIBITOR, CLADE A (ALPHA-1 ANTIPROTEINASE, ANTITRYPSIN), MEMBER 6. [MASS=44671]	4	4	Rattus norvegicus (Rat) PREDICTED: COMPLEMENT COMPONENT 7. [MASS=90661]
4	4	Rattus norvegicus (Rat) 14-3-3 PROTEIN THETA. [MASS=27778]	4	4	Rattus norvegicus (Rat) LEUKEMIA INHIBITORY FACTOR RECEPTOR PRECURSOR. [MASS=122394]	3	6	Rattus norvegicus (Rat) SP120-Heterogeneous nuclear ribonucleoprotein U. [MASS=87748]	4	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CC1ETA. ETA SUBUNIT OF THE CHAPERONIN CONTAINING TCP-1. [MASS=75684]
4	4	Rattus norvegicus (Rat) ALPHA ISOFORM OF REGULATORY SUBUNIT A. PROTEIN PHOSPHATASE 2. [MASS=65323]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PLEXIN-B2 PRECURSOR. [MASS=216119]	3	6	Rattus norvegicus (Rat) RIBOSOMAL PROTEIN S27A. [MASS=17951]	4	4	Rattus norvegicus (Rat) PREDICTED: COMPLEMENT COMPONENT 5. [MASS=152144]
4	4	Rattus norvegicus (Rat) PROTEIN KINASE C- BINDING PROTEIN NELL2. [MASS=91334]	4	5	Rattus norvegicus (Rat) LOW-DENSITY LIPOPROTEIN RECEPTOR-RELATED PROTEIN 2 PRECURSOR. [MASS=519276]	3	4	Rattus norvegicus (Rat) SPLICE ISOFORM 2 OF RECEPTOR-TYPE TYROSINE-PROTEIN PHOSPHATASE ZETA PRECURSOR. [MASS=164596]	4	6	Rattus norvegicus (Rat) NEUROCAN CORE PROTEIN PRECURSOR. [MASS=135545]

# of unique peptides from protein	Total # peptides	Protein matches E12.5	# of unique peptides from protein	Total # peptides	Protein matches E14 LV	# of unique peptides from protein	Total number of peptides	Protein matches E14 4thV	# of unique peptides from protein	Total # of peptides	Protein matches E17.5 LV
4	4	Rattus norvegicus (Rat) <u>STRUCTURAL MAINTENANCE OF CHROMOSOME 3</u> . [MASS=138448]	4	4	Rattus norvegicus (Rat) <u>LEUKOCYTE COMMON ANTIGEN-RELATED PHOSPHATASE PRECURSOR</u> . [MASS=212954]	3	3	Rattus norvegicus (Rat) <u>60S RIBOSOMAL PROTEIN L13</u> . [MASS=24178]	4	5	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO SEIZURE 6-LIKE PROTEIN PRECURSOR</u> . [MASS=145870]
4	4	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO IMPORTIN 7</u> . [MASS=119704]	4	7	Rattus norvegicus (Rat) <u>PROTODACADHERIN GAMMA SUBFAMILY C, 3</u> . [MASS=101038]	3	3	Rattus norvegicus (Rat) <u>PREDICTED: COMPLEMENT COMPONENT 7</u> . [MASS=90661]	4	4	Rattus norvegicus (Rat) <u>HEPARIN COFACTOR 2 PRECURSOR</u> . [MASS=54552]
4	4	Rattus norvegicus (Rat) <u>CADHERIN-6 PRECURSOR</u> . [MASS=88341]	4	4	Rattus norvegicus (Rat) <u>MYOSIN-9</u> . [MASS=226207]	3	3	Rattus norvegicus (Rat) <u>VIMENTIN</u> . [MASS=53602]	4	4	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO DNA REPLICATION LICENSING FACTOR MCM2</u> . [MASS=102272]
4	7	Rattus norvegicus (Rat) <u>VITAMIN D-BINDING PROTEIN PRECURSOR</u> . [MASS=53544]	4	4	Rattus norvegicus (Rat) <u>14-3-3 PROTEIN EPSILON</u> . [MASS=29174]	3	3	Rattus norvegicus (Rat) <u>LEUKOCYTE COMMON ANTIGEN-RELATED PHOSPHATASE PRECURSOR</u> . [MASS=207012]	4	5	Rattus norvegicus (Rat) <u>PREDICTED: NIDOGN</u> . [MASS=138365]
4	4	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO ALANYL-TRNA SYNTHETASE</u> . [MASS=106811]	4	4	Rattus norvegicus (Rat) <u>THROMBOSPONDIN 1</u> . [MASS=129671]	3	3	Rattus norvegicus (Rat) <u>NEUROSERPIN PRECURSOR</u> . [MASS=46278]	4	7	Rattus norvegicus (Rat) <u>PEPTIDYLPROLYL ISOMERASE C</u> . [MASS=23009]
4	4	Rattus norvegicus (Rat) <u>PREDICTED: TRANSFORMING GROWTH FACTOR, BETA INDUCED, 68 KDA</u> . [MASS=74369]	4	7	Rattus norvegicus (Rat) <u>HISTONE H1.2</u> . [MASS=21856]	3	4	Rattus norvegicus (Rat) <u>NEUROCAN CORE PROTEIN PRECURSOR</u> . [MASS=135545]	4	4	Rattus norvegicus (Rat) <u>SPLICE ISOFORM 2 OF POLYPYRIMIDINE TRACT-BINDING PROTEIN 2</u> . [MASS=57645]
4	4	Rattus norvegicus (Rat) <u>PREDICTED: similar to phosphoribosylformylglycinamidine synthase</u> . [MASS=146178]	3	3	Rattus norvegicus (Rat) <u>RATSG1</u> . [MASS=49199]	3	3	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO AMYLOID BETA (A4) PRECURSOR-LIKE PROTEIN 1</u> . [MASS=68777]	4	4	Rattus norvegicus (Rat) <u>TXNRD1 PROTEIN</u> . [MASS=63002]

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4	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CRB2 PROTEIN. [MASS=138781]	3	3	Rattus norvegicus (Rat) CC2-27. [MASS=120523]	3	3	Rattus norvegicus (Rat) HEPARIN COFACTOR 2 PRECURSOR. [MASS=54552]	4	5	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [MASS=62473]
4	4	Rattus norvegicus (Rat) AFAMIN PRECURSOR. [MASS=69335]	3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA ENOLASE. [MASS=46489]	3	3	Rattus norvegicus (Rat) NETRIN RECEPTOR UNC5C PRECURSOR. [MASS=103135]	4	5	Rattus norvegicus (Rat) QUIESCIN Q6. [MASS=82412]
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RANBP21. [MASS=136714]	3	4	Rattus norvegicus (Rat) HYRAC. [MASS=31353]	3	3	Rattus norvegicus (Rat) CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 1. [MASS=136362]	4	6	Rattus norvegicus (Rat) POLY [ADP-RIBOSE] POLYMERASE 1. [MASS=112529]
4	6	Rattus norvegicus (Rat) BETA-2- MICROGLOBULIN PRECURSOR. [MASS=13720]	3	5	Rattus norvegicus (Rat) VITAMIN D-BINDING PROTEIN PRECURSOR. [MASS=53544]	3	3	Rattus norvegicus (Rat) LEUKEMIA INHIBITORY FACTOR RECEPTOR PRECURSOR. [MASS=122394]	4	4	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF CULLIN-ASSOCIATED NEDD8-DISSOCIATED PROTEIN 2. [MASS=139673]
4	6	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L13. [MASS=24178]	3	5	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A2. [MASS=46489]	3	3	Rattus norvegicus (Rat) CLATHRIN HEAVY CHAIN. [MASS=191599]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO INTER-ALPHA TRYPSIN INHIBITOR, HEAVY CHAIN 1. [MASS=104581]
4	6	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S6. [MASS=28681]	3	3	Rattus norvegicus (Rat) PREDICTED: similar to phosphoribosylformylglc namidine synthase. [MASS=146178]	3	3	Rattus norvegicus (Rat) FAM3C-LIKE PROTEIN. [MASS=24714]	4	4	Rattus norvegicus (Rat) MANNOSIDASE 2, ALPHA B1. [MASS=114327]
4	5	Rattus norvegicus (Rat) 14-3-3 PROTEIN GAMMA. [MASS=28171]	3	4	Rattus norvegicus (Rat) FOLLISTATIN-RELATED PROTEIN 1 PRECURSOR. [MASS=34622]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ ALPHA-1 CHAIN PRECURSOR- MOUSE. [MASS=338692]	4	4	Rattus norvegicus (Rat) STRUCTURAL MAINTENANCE OF CHROMOSOME 3. [MASS=138448]
4	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROGRAMMED CELL DEATH 6 INTERACTING PROTEIN. [MASS=75806]	3	3	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN SA. [MASS=32693]	3	3	Rattus norvegicus (Rat) THROMBOSPONDIN 1. [MASS=129671]	4	4	Rattus norvegicus (Rat) DIHYDROXYRIMIDINASE- RELATED PROTEIN 2. [MASS=62278]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PUTATIVE PRE- MRNA SPLICING FACTOR RNA HELICASE. [MASS=90977]	3	3	Rattus norvegicus (Rat) 14-3-3 PROTEIN THETA. [MASS=27778]	2	2	Rattus norvegicus (Rat) MANNOSIDASE ALPHA. CLASS 1A, MEMBER 1. [MASS=73125]	4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO P30 DBC PROTEIN. [MASS=114440]
4	15	Rattus norvegicus (Rat) EXTRACELLULAR SUPEROXIDE DISMUTASE [CU-ZN] PRECURSOR. [MASS=26620]	3	3	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L18. [MASS=21527]	2	3	Rattus norvegicus (Rat) HYRAC. [MASS=31353]	4	4	Rattus norvegicus (Rat) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 1. [MASS=105748]
4	4	Rattus norvegicus (Rat) SMC4L1 PROTEIN. [MASS=146806]	3	4	Rattus norvegicus (Rat) ADENOSYLHOMOCYST EINASE. [MASS=47407]	2	2	Rattus norvegicus (Rat) SEZ6B. [MASS=105607]	4	4	Rattus norvegicus (Rat) FAM3C-LIKE PROTEIN. [MASS=24714]
4	4	Rattus norvegicus (Rat) SPLICEOSOME RNA HELICASE BAT1. [MASS=49035]	3	3	Rattus norvegicus (Rat) SPARC PRECURSOR. [MASS=34384]	2	3	Rattus norvegicus (Rat) IG KAPPA CHAIN C REGION, B ALLELE. [MASS=11601]	4	4	Rattus norvegicus (Rat) LEUKEMIA INHIBITORY FACTOR RECEPTOR PRECURSOR. [MASS=122394]
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 40S RIBOSOMAL PROTEIN S9. [MASS=22648]	3	3	Rattus norvegicus (Rat) PROCOLLAGEN- LYSINE 2- OXOGLUTARATE 5- DIOXYGENASE 3 PRECURSOR. [MASS=85060]	2	2	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A2. [MASS=46489]	4	4	Rattus norvegicus (Rat) HAUSP. [MASS=128431]
4	4	Rattus norvegicus (Rat) 60S ACIDIC RIBOSOMAL PROTEIN P0. [MASS=34215]	3	3	Rattus norvegicus (Rat) PREDICTED: similar to C- 1-TETRAHYDROFOLATE SYNTHASE. CYTOPLASMIC. [MASS=100351]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CG1841-PA. ISOFORM A. [MASS=52522]	4	4	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(I) CHAIN PRECURSOR. [MASS=137886]
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO P30 DBC PROTEIN. [MASS=114440]	3	3	Rattus norvegicus (Rat) M-CADHERIN. [MASS=85753]	2	2	Rattus norvegicus (Rat) ALPHA-2-HS- GLYCOPROTEIN PRECURSOR. [MASS=37982]	4	6	Rattus norvegicus (Rat) FETUB PROTEIN. [MASS=43169]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thv	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ISOLEUCINE-TRNA SYNTHETASE. [MASS=144169]	3	11	Rattus norvegicus (Rat) RIBOSOMAL PROTEIN S27A. [MASS=17951]	2	3	Rattus norvegicus (Rat) VITAMIN D-BINDING PROTEIN PRECURSOR. [MASS=53544]	3	3	Rattus norvegicus (Rat) PROTEASOME SUBUNIT ALPHA TYPE 2. [MASS=25795]
4	5	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S10. [MASS=18916]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA NAC19.2. PROTEIN. [MASS=23384]	2	2	Rattus norvegicus (Rat) VACUOLAR ATP SYNTHASE SUBUNIT S1 PRECURSOR. [MASS=51123]	3	3	Rattus norvegicus (Rat) RATSG1. [MASS=49199]
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VINCULIN. [MASS=116615]	3	5	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ALPHA-1B- GLYCOPROTEIN PRECURSOR. [MASS=56479]	2	2	Rattus norvegicus (Rat) PREDICTED: ATPASE, H+ TRANSPORTING, LYSOSOMAL ACCESSORY PROTEIN 2. [MASS=66094]	3	4	Rattus norvegicus (Rat) COFILIN-1. [MASS=24588]
4	4	Rattus norvegicus (Rat) PREDICTED: CALSYNTENIN 1. [MASS=109351]	3	3	Rattus norvegicus (Rat) SUPEROXIDE DISMUTASE. [MASS=15780]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROCOLLAGEN TYPE IX, ALPHA 2. [MASS=71422]	3	5	Rattus norvegicus (Rat) PEPTIDYL-PROLYL CIS- TRANS ISOMERASE A. [MASS=17743]
4	4	Rattus norvegicus (Rat) EAR UPSTREAM ELEMENT-BINDING PROTEIN 2. [MASS=74226]	3	4	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A, ISOFORM 1. [MASS=46154]	2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA ENOLASE. [MASS=46489]	3	4	Rattus norvegicus (Rat) RAB GDP DISSOCIATION INHIBITOR BETA. [MASS=50685]
4	5	Rattus norvegicus (Rat) L- LACTATE DEHYDROGENASE A CHAIN. [MASS=36451]	3	5	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(V) CHAIN PRECURSOR. [MASS=184610]	2	3	Rattus norvegicus (Rat) SOLUBLE CALCIUM- ACTIVATED NUCLEOTIDASE 1. [MASS=45659]	3	3	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN SA. [MASS=32693]
4	4	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ACETYL-COA CARBOXYLASE 1. [MASS=265421]	3	3	Rattus norvegicus (Rat) NONO/P54NRB HOMOLOG. [MASS=75487]	2	2	Rattus norvegicus (Rat) VASCULAR CELL ADHESION PROTEIN 1 PRECURSOR. [MASS=81246]	3	3	Rattus norvegicus (Rat) PHOSPHATIDYLETHANOLAMI NE-BINDING PROTEIN. [MASS=20670]
4	4	Rattus norvegicus (Rat) MICROTUBULE- ASSOCIATED PROTEIN 4. [MASS=110301]	3	3	Rattus norvegicus (Rat) PREDICTED: CALSYNTENIN 1. [MASS=109351]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to alpha 1 type II collagen. [MASS=138706]	3	3	Rattus norvegicus (Rat) SECRETORIN-3 PRECURSOR. [MASS=53183]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
4	4	Rattus norvegicus (Rat) COLD SHOCK DOMAIN- CONTAINING PROTEIN E1. IMASS=88895	3	3	Rattus norvegicus (Rat) RUVB-LIKE 1. IMASS=50214	2	2	Rattus norvegicus (Rat) C-REACTIVE PROTEIN PRECURSOR. IMASS=25468	3	5	Rattus norvegicus (Rat) PEROXIREDOXIN-2. IMASS=21652
4	4	Rattus norvegicus (Rat) 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 1. IMASS=105748	3	4	Rattus norvegicus (Rat) PREDICTED similar to POSTSYNAPTIC DENSITY PROTEIN. IMASS=186848	2	3	Rattus norvegicus (Rat) EPITHELIAL-CADHERIN PRECURSOR. IMASS=98715	3	5	Rattus norvegicus (Rat) SERINE/CYSTEINE PROTEINASE INHIBITOR. CLADE C MEMBER 1. IMASS=52234
4	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAS GTPASE- ACTIVATING-LIKE PROTEIN IQGAP1. IMASS=196522	3	3	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L4. IMASS=47126	2	2	Rattus norvegicus (Rat) BIFUNCTIONAL HEPARAN SULFATE N- DEACETYLASE/N- SULFOTRANSFERASE 1 (EC 2.8.2.8) (GLUCOSAMINYL N- DEACETYLASE/N- SULFOTRANSFERASE 1) (NDST-1) L. IMASS=101202	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO AMYLOID BETA (A4) PRECURSOR-LIKE PROTEIN 1. IMASS=68777
4	5	Rattus norvegicus (Rat) GTP-BINDING NUCLEAR PROTEIN RAN. TESTIS- SPECIFIC ISOFORM. IMASS=24451	3	3	Rattus norvegicus (Rat) PROTEIN DISULFIDE- ISOMERASE PRECURSOR. IMASS=56951	2	2	Rattus norvegicus (Rat) SPARC PRECURSOR. IMASS=34384	3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5. IMASS=99947
3	3	Rattus norvegicus (Rat) 14-3-3 PROTEIN ZETA/DELTA. IMASS=27771	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ-2 ALPHA2 CHAIN PRECURSOR. IMASS=359007	2	2	Rattus norvegicus (Rat) PREDICTED: GLYCOPROTEIN-4- BETA- GALACTOSYL TRANSFERASE 2. IMASS=44484	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROGRAMMED CELL DEATH 6 INTERACTING PROTEIN. IMASS=75806
3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA ENOLASE. IMASS=46489	3	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO INTER-ALPHA- INHIBITOR H2 CHAIN. IMASS=105715	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PAPPAALYSIN-2 PRECURSOR. IMASS=204770	3	6	Rattus norvegicus (Rat) PREDICTED: DYSTROGLYCAN 1. IMASS=96706
3	5	Rattus norvegicus (Rat) GLUTATHIONE PEROXIDASE 3 PRECURSOR. IMASS=25393	3	3	Rattus norvegicus (Rat) SHEN-DAN. IMASS=131080	2	2	Rattus norvegicus (Rat) MASP-3 PROTEIN. IMASS=82497	3	3	Rattus norvegicus (Rat) PREDICTED: similar to Silt-like 2. IMASS=72321

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
3	6	Rattus norvegicus (Rat) PREDICTED: DYSTROGLYCAN 1, [MASS=96706]	3	3	Rattus norvegicus (Rat) FAR UPSTREAM ELEMENT-BINDING PROTEIN 2, [MASS=74226]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to T- complex protein 1 subunit theta, [MASS=59745]	3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN D0, [MASS=38192]
3	3	Rattus norvegicus (Rat) COFILIN-1, [MASS=24588]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO IMPORTIN 9, [MASS=131739]	2	2	Rattus norvegicus (Rat) NUCLEAR AUTOANTIGENIC SPERM PROTEIN, [MASS=84200]	3	3	Rattus norvegicus (Rat) NEURAL CELL ADHESION MOLECULE 1, 140 KDA ISOFORM PRECURSOR, [MASS=94658]
3	3	Rattus norvegicus (Rat) HEAT-SHOCK PROTEIN 105 KDA, [MASS=96419]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VINCULIN, [MASS=116615]	2	2	Rattus norvegicus (Rat) SUPEROXIDE DISMUTASE, [MASS=15780]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PUTATIVE PRE-MRNA SPLICING FACTOR RNA HELICASE, [MASS=90977]
3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA NAC/H 9.2, PROTEIN, [MASS=23384]	3	4	Rattus norvegicus (Rat) PREDICTED similar to Nuclear autoantigenic sperm protein, [MASS=45764]	2	3	Rattus norvegicus (Rat) APOLIPOPROTEIN D PRECURSOR, [MASS=21635]	3	3	Rattus norvegicus (Rat) DNA POLYMERASE ALPHA CATALYTIC SUBUNIT (FRAGMENT), [MASS=165306]
3	7	Rattus norvegicus (Rat) TUMOR NECROSIS FACTOR TYPE I RECEPTOR ASSOCIATED PROTEIN, [MASS=80461]	3	3	Rattus norvegicus (Rat) FAM3C-LIKE PROTEIN, [MASS=24714]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROGRAMMED CELL DEATH 6 INTERACTING PROTEIN, [MASS=75806]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ARX, [MASS=121446]
3	4	Rattus norvegicus (Rat) FRUCTOSE- BISPHOSPHATE ALDOLASE A, [MASS=39221]	3	3	Rattus norvegicus (Rat) D-3- PHOSPHOGLYCERATE DEHYDROGENASE, [MASS=56362]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEMAPHORIN 6D-4, [MASS=159473]	3	4	Rattus norvegicus (Rat) FOLLISTATIN-RELATED PROTEIN 1 PRECURSOR, [MASS=34622]
3	3	Rattus norvegicus (Rat) PREDICTED: BRAIN GLYCOGEN PHOSPHORYLASE, [MASS=96738]	3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLLAGEN ALPHA 2(IV) CHAIN PRECURSOR - MOUSE, [MASS=192535]	2	4	Rattus norvegicus (Rat) IGH-1A PROTEIN, [MASS=51403]	3	4	Rattus norvegicus (Rat) SPLICE ISOFORM PYBP1 OF POLYPYRIMIDINE TRACT- BINDING PROTEIN 1, [MASS=56937]
3	7	Rattus norvegicus (Rat) CYSTATIN C PRECURSOR, [MASS=15437]	3	4	Rattus norvegicus (Rat) PROLIFERATION- ASSOCIATED 2C4, 38KDA, [MASS=43657]	2	2	Rattus norvegicus (Rat) L- LACTATE DEHYDROGENASE A CHAIN, [MASS=36451]	3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK PROTEIN HSP 90-BETA, [MASS=80701]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PTK7 PROTEIN TYROSINE KINASE 7. [MASS=139818]	3	6	Rattus norvegicus (Rat) 14-3-3 PROTEIN GAMMA. [MASS=28171]	2	3	Rattus norvegicus (Rat) RECEPTOR-LIKE PROTEIN TYROSINE PHOSPHATASE KAPPA EXTRACELLULAR REGION. [MASS=56159]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DNA REPLICATION LICENSING FACTOR MCM5. [MASS=91577]
3	10	Rattus norvegicus (Rat) RIBOSOMAL PROTEIN S27A. [MASS=17951]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAS GTPASE-ACTIVATING-LIKE PROTEIN IQGAP1. [MASS=196522]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEROTRANSFERRIN PRECURSOR. [MASS=76607]	3	5	Rattus norvegicus (Rat) PROFILIN-1. [MASS=14826]
3	3	Rattus norvegicus (Rat) COMPLEMENT C4 PRECURSOR. [MASS=192163]	3	3	Rattus norvegicus (Rat) PROTODCADERLIN. [MASS=505997]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RAN BINDING PROTEIN 5. [MASS=133476]	3	3	Rattus norvegicus (Rat) PREDICTED: CALSYNTENIN 1. [MASS=109351]
3	3	Rattus norvegicus (Rat) POLY (ADP-RIBOSE) POLYMERASE 1. [MASS=112529]	3	3	Rattus norvegicus (Rat) CHAPERONIN SUBUNIT 6A. [MASS=56017]	2	3	Rattus norvegicus (Rat) APOLIPOPROTEIN M PRECURSOR. [MASS=21513]	3	5	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L18. [MASS=21527]
3	4	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S4. X ISOFORM. [MASS=29467]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EUKARYOTIC TRANSLATION INITIATION FACTOR 3. SUBUNIT 10 THETA. 150/170KDA. [MASS=192616]	2	2	Rattus norvegicus (Rat) HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=83185]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SPLICING FACTOR 3B. SUBUNIT 3. 130KDA. [MASS=174174]
3	4	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S8. [MASS=24074]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VERY LARGE G PROTEIN-COUPLED RECEPTOR 1. [MASS=413840]	2	2	Rattus norvegicus (Rat) CATHEPSIN D PRECURSOR. [MASS=44681]	3	3	Rattus norvegicus (Rat) SPARC-LIKE PROTEIN 1 PRECURSOR. [MASS=70634]
3	3	Rattus norvegicus (Rat) EPSILON 3 GLOBIN. [MASS=16540]	3	3	Rattus norvegicus (Rat) CADHERIN EGF LAG SEVEN-PASS G-TYPE RECEPTOR 2. [MASS=317122]	2	3	Rattus norvegicus (Rat) MICROFIBRILLAR-ASSOCIATED PROTEIN 4. [MASS=29050]	3	3	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 4A2. [MASS=46489]

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3	3	Rattus norvegicus (Rat) PREDICTED: PHOSPHORIBOSYL GLY CINAMIDE FORMYLTRANSFERASE [MASS=107580]	3	4	Rattus norvegicus (Rat) STATHMIN [MASS=17157]	2	2	Rattus norvegicus (Rat) FRUCTOSE- BISPHOSPHATE ALDOLASE A [MASS=39221]	3	5	Rattus norvegicus (Rat) EXTRACELLULAR SUPEROXIDE DISMUTASE [CU-ZN] PRECURSOR [MASS=26620]
3	6	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK PROTEIN HSP 90-BETA [MASS=80701]	3	3	Rattus norvegicus (Rat) GTP-BINDING NUCLEAR PROTEIN RAN, TESTIS- SPECIFIC ISOFORM [MASS=24451]	2	3	Rattus norvegicus (Rat) ADAMTS-1 PRECURSOR [MASS=105719]	3	3	Rattus norvegicus (Rat) CADHERIN-6 PRECURSOR [MASS=88341]
3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ATTRACTIN PRECURSOR [MASS=163296]	3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ISOLEUCINE-TRNA SYNTHETASE [MASS=144169]	2	2	Rattus norvegicus (Rat) BETA-2- GLYCOPROTEIN 1 PRECURSOR [MASS=33197]	3	5	Rattus norvegicus (Rat) RIBOSOMAL PROTEIN S27A [MASS=17951]
3	3	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S3 [MASS=26674]	3	3	Rattus norvegicus (Rat) HISTONE H1.0 [MASS=20754]	2	2	Rattus norvegicus (Rat) BONE MORPHOGENETIC PROTEIN 1 [MASS=11332]	3	3	Rattus norvegicus (Rat) PREDICTED: NIDOGEN 2 [MASS=173960]
3	7	Rattus norvegicus (Rat) PREDICTED similar to HEAT SHOCK PROTEIN 86, [MASS=56953]	2	2	Rattus norvegicus (Rat) COELIN-1 [MASS=24588]	2	2	Rattus norvegicus (Rat) RECEPTOR-LIKE PROTEIN TYROSINE PHOSPHATASE GAMMA B-TYPE ISOFORM [MASS=156024]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO UBIQUITIN SPECIFIC PROTEASE 9, X-LINKED [MASS=290681]
3	3	Rattus norvegicus (Rat) GAMMA-GLUTAMYL HYDROLASE PRECURSOR [MASS=35830]	2	4	Rattus norvegicus (Rat) ALPHA-2-HS- GLYCOPROTEIN PRECURSOR [MASS=37982]	2	6	Rattus norvegicus (Rat) DERMICIDIN [MASS=11284]	3	3	Rattus norvegicus (Rat) SMC4L1 PROTEIN [MASS=146806]
3	3	Rattus norvegicus (Rat) QUIESCIN Q6 [MASS=82412]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LERK-5 [MASS=37282]	2	2	Rattus norvegicus (Rat) CALUMENIN PRECURSOR [MASS=36997]	3	3	Rattus norvegicus (Rat) PREDICTED: similar to Heterogeneous nuclear ribonucleoproteins A2/B1, [MASS=32468]

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3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DNA REPLICATION LICENSING FACTOR MCM3. [MASS=83429]	2	3	Rattus norvegicus (Rat) L-LACTATE DEHYDROGENASE B CHAIN. [MASS=36481]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to Perlecan precursor (PN) (Osteoblast-specific factor 2) (OSF-2). [MASS=90252]	3	3	Rattus norvegicus (Rat) KINESIN-1 HEAVY CHAIN. [MASS=109531]
3	3	Rattus norvegicus (Rat) DELETED IN COLORECTAL CANCER. [MASS=158142]	2	2	Rattus norvegicus (Rat) PREDICTED: PROTOCADHERIN 12. [MASS=127964]	2	8	Rattus norvegicus (Rat) AMBP PROTEIN PRECURSOR. [MASS=38851]	3	3	Rattus norvegicus (Rat) ADAMTS-1 PRECURSOR. [MASS=105719]
3	3	Rattus norvegicus (Rat) ALPHA-ACTININ-1. [MASS=102960]	2	2	Rattus norvegicus (Rat) PREDICTED: ATPASE H+ TRANSPORTING LYOSOMAL ACCESSORY PROTEIN 2. [MASS=66094]	2	2	Rattus norvegicus (Rat) PROBABLE G-PROTEIN COUPLED RECEPTOR 116 PRECURSOR. [MASS=149446]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PLEXIN-B2 PRECURSOR. [MASS=216119]
3	3	Rattus norvegicus (Rat) COATOMER SUBUNIT BETA. [MASS=102420]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=80701]	2	2	Rattus norvegicus (Rat) PLATELET ENDOTHELIAL CELL ADHESION MOLECULE PRECURSOR. [MASS=76189]	3	3	Rattus norvegicus (Rat) PREDICTED: KINESIN FAMILY MEMBER 4. [MASS=139682]
3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO P59 IMMUNOPHILIN. [MASS=80396]	2	2	Rattus norvegicus (Rat) IGH-1A PROTEIN. [MASS=51403]	2	3	Rattus norvegicus (Rat) PREDICTED similar to FIBRINOGEN, GAMMA POLYPEPTIDE. [MASS=49121]	3	3	Rattus norvegicus (Rat) NON-ERYTHROCYTE BETA-SPECTRIN. [MASS=251205]
3	3	Rattus norvegicus (Rat) FIBRINOGEN BETA CHAIN PRECURSOR. [MASS=54303]	2	2	Rattus norvegicus (Rat) FIBRILLIN-2. [MASS=313374]	2	2	Rattus norvegicus (Rat) PREDICTED: AMINOPEPTIDASE PUROMYCIN SENSITIVE. [MASS=103344]	3	3	Rattus norvegicus (Rat) D-3-PHOSPHOGLYCERATE DEHYDROGENASE. [MASS=56362]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 40S RIBOSOMAL PROTEIN S3. [MASS=26630]	2	2	Rattus norvegicus (Rat) NUCLEOSOME ASSEMBLY PROTEIN 1-LIKE 1. [MASS=45373]	2	2	Rattus norvegicus (Rat) SPLICE ISOFORM PAM-1 OF PEPTIDYL-GLYCINE ALPHA-AMIDATING MONOOXYGENASE PRECURSOR. [MASS=108819]	3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF ACETYL-COA CARBOXYLASE 1. [MASS=265421]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
3	3	Rattus norvegicus (Rat) ALPHA-1-ACID GLYCOPROTEIN PRECURSOR. [MASS=23575]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO UBIQUITIN- CONJUGATING ENZYME E2 L3. [MASS=17862]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN A. [MASS=290169]	3	3	Rattus norvegicus (Rat) NUCLEOLIN. [MASS=77276]
3	3	Rattus norvegicus (Rat) ALPHA-1- MACROGLOBULIN. [MASS=167125]	2	2	Rattus norvegicus (Rat) FRUCTOSE- BISPHOSPHATE ALDOLASE A. [MASS=39221]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 19 PRECURSOR. [MASS=125989]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEROTRANSFERRIN PRECURSOR. [MASS=76607]
3	3	Rattus norvegicus (Rat) LIVER CARBOXYLESTERASE 1 PRECURSOR. [MASS=60175]	2	2	Rattus norvegicus (Rat) APOLOPROTEIN M PRECURSOR. [MASS=21513]	2	2	Rattus norvegicus (Rat) VITAMIN K-DEPENDENT PROTEIN S PRECURSOR. [MASS=74627]	3	4	Rattus norvegicus (Rat) PREDICTED: HYPOTHETICAL PROTEIN XP_579585. [MASS=275729]
3	3	Rattus norvegicus (Rat) SIMILAR TO RIKEN CDNA 2810409H07. [MASS=44535]	2	2	Rattus norvegicus (Rat) HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN C. [MASS=34385]	2	2	Rattus norvegicus (Rat) SEMA4B PROTEIN (FRAGMENT). [MASS=79477]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLONIC AND HEPATIC TUMOR OVER-EXPRESSED PROTEIN ISOFORM A. [MASS=198456]
3	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PHOSPHOLIPID TRANSFER PROTEIN. [MASS=65430]	2	2	Rattus norvegicus (Rat) IG KAPPA CHAIN C REGION, B ALLELE. [MASS=11601]	2	2	Rattus norvegicus (Rat) RHO GDP DISSOCIATION INHIBITOR (GDI) ALPHA. [MASS=23407]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO FILAMIN B. [MASS=291469]
3	3	Rattus norvegicus (Rat) 26S PROTEASE REGULATORY SUBUNIT 8. [MASS=45626]	2	4	Rattus norvegicus (Rat) PYRUVATE KINASE, MUSCLE. [MASS=57976]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EXPRESSED SEQUENCE C79407. [MASS=113188]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CHROMOSOME CONDENSATION PROTEIN G. [MASS=113137]
3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=54660]	2	2	Rattus norvegicus (Rat) NUCLEOSIDE DIPHOSPHATE KINASE A. [MASS=17193]	2	2	Rattus norvegicus (Rat) MYOSIN-10. [MASS=228965]	3	13	Rattus norvegicus (Rat) AMBP PROTEIN PRECURSOR. [MASS=38851]
3	3	Rattus norvegicus (Rat) SUPEROXIDE DISMUTASE. [MASS=15780]	2	2	Rattus norvegicus (Rat) TUBULIN, BETA, 2. [MASS=49801]	2	2	Rattus norvegicus (Rat) GM2 GANGLIOSIDE ACTIVATOR PROTEIN. [MASS=21493]	3	3	Rattus norvegicus (Rat) Neogenin precursor. [MASS=156144]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
3	3	Rattus norvegicus (Rat) PREDICTED: HYPOTHETICAL PROTEIN XP_579585. [MASS=275729]	2	2	Rattus norvegicus (Rat) PREDICTED: GLYCOPROTEIN-4- BETA- GALACTOSYLTRANSFERASE 2. [MASS=44484]	2	2	Rattus norvegicus (Rat) PREDICTED: PROCOLLAGEN TYPE XII, ALPHA 1. [MASS=367709]	3	3	Rattus norvegicus (Rat) LEUCYL-TRNA SYNTHETASE. [MASS=134279]
3	3	Rattus norvegicus (Rat) LOW-DENSITY LIPOPROTEIN RECEPTOR PRECURSOR. [MASS=96622]	2	2	Rattus norvegicus (Rat) ALPHA-1-ACID GLYCOPROTEIN PRECURSOR. [MASS=23575]	2	2	Rattus norvegicus (Rat) EPSILON 2 GLOBIN. [MASS=16388]	3	3	Rattus norvegicus (Rat) PREDICTED: THROMBOSPONDIN 4. [MASS=121361]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCADHERIN 18 PRECURSOR. [MASS=123552]	2	2	Rattus norvegicus (Rat) BETA-1.3-N- ACETYLGLUCOSAMINY LTRANSFERASE LUNATIC FRINGE. [MASS=41958]	2	4	Rattus norvegicus (Rat) HISTONE H1.2. [MASS=21856]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO TALIN 2. [MASS=273281]
3	3	Rattus norvegicus (Rat) SPLICE ISOFORM B OF AP-1 COMPLEX SUBUNIT BETA-1. [MASS=103873]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ELASTIN MICROFIBRIL INTERFACER 1. [MASS=107560]	2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L8. [MASS=27893]	3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO OLLISTATIN-LIKE 5. [MASS=95918]
3	3	Rattus norvegicus (Rat) COLLAGEN ALPHA-2(I) CHAIN PRECURSOR. [MASS=129564]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A2/B1. [MASS=38284]	2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LIPOPROTEIN RECEPTOR-RELATED PROTEIN. [MASS=504889]	3	3	Rattus norvegicus (Rat) THROMBOSPONDIN 1. [MASS=129671]
3	3	Rattus norvegicus (Rat) SHEN-DAN. [MASS=131080]	2	2	Rattus norvegicus (Rat) IPA: proteasome subunit beta type 6-like. [MASS=25304]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SUSHI, VON WILLEBRAND FACTOR TYPE A, EGF AND PENTRAXIN DOMAIN CONTAINING 1. [MASS=383558]	3	4	Rattus norvegicus (Rat) STAT-MIN. [MASS=17157]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # peptide s	Protein matches E17.5 LV
3	3	Rattus norvegicus (Rat) SPARC-LIKE PROTEIN 1 PRECURSOR. IMASS=70634	2	2	Rattus norvegicus (Rat) BETA-2-GLYCOPROTEIN 1 PRECURSOR. IMASS=33197	2	2	Rattus norvegicus (Rat) GTP-BINDING NUCLEAR PROTEIN RAN. TESTIS-SPECIFIC ISOFORM. IMASS=24451	3	4	Rattus norvegicus (Rat) PREDICTED: GLYCOPROTEIN-4-BETA-GALACTOSYLTRANSFERASE 2. IMASS=44484
3	3	Rattus norvegicus (Rat) NUCLEOSIDE DIPHOSPHATE KINASE B. IMASS=17283	2	2	Rattus norvegicus (Rat) GRP78 BINDING PROTEIN. IMASS=110574	2	2	Rattus norvegicus (Rat) 14-3-3 PROTEIN EPSILON. IMASS=29174	3	4	Rattus norvegicus (Rat) HISTONE H1.2. IMASS=21856
3	3	Rattus norvegicus (Rat) D-3-PHOSPHOGLYCERATE DEHYDROGENASE. IMASS=56362	2	2	Rattus norvegicus (Rat) HAPTOGLOBIN PRECURSOR. IMASS=38549	2	2	Rattus norvegicus (Rat) INSULIN-LIKE GROWTH FACTOR-BINDING PROTEIN COMPLEX ACID LABILE CHAIN PRECURSOR. IMASS=66812	3	3	Rattus norvegicus (Rat) PEROXIREDOXIN-1. IMASS=22109
3	3	Rattus norvegicus (Rat) PROTEIN DISULFIDE-ISOMERASE A3 PRECURSOR. IMASS=57079	2	3	Rattus norvegicus (Rat) PREDICTED: similar to alpha 1 type II collagen. IMASS=138706				2	3	Rattus norvegicus (Rat) ALPHA-ENOLASE. IMASS=46997
3	3	Rattus norvegicus (Rat) LARGE PROLINE-RICH PROTEIN BAT3. IMASS=114647	2	2	Rattus norvegicus (Rat) COLLAGEN TYPE A1(XI)7-8. IMASS=45691				2	4	Rattus norvegicus (Rat) RAB GDP DISSOCIATION INHIBITOR ALPHA. IMASS=50537
3	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO IMPORTIN 9. IMASS=131739	2	2	Rattus norvegicus (Rat) PROPROTEIN CONVERTASE SUBTILISIN/KEXIN TYPE 9 PRECURSOR. IMASS=74709				2	2	Rattus norvegicus (Rat) ANGIOTENSIN-CONVERTING ENZYME, SOMATIC ISOFORM PRECURSOR. IMASS=150908
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 25 KDA FK506-BINDING PROTEIN. IMASS=25179	2	2	Rattus norvegicus (Rat) NUCLEIC ACID BINDING FACTOR PRM10. IMASS=33815				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA ENOLASE. IMASS=46489
3	3	Rattus norvegicus (Rat) DNA POLYMERASE DELTA CATALYTIC SUBUNIT. IMASS=123601	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA 3 TYPE VI COLLAGEN ISOFORM 1 PRECURSOR. IMASS=369017				2	4	Rattus norvegicus (Rat) PREDICTED similar to HEAT SHOCK PROTEIN 86. IMASS=56953

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3	3	Rattus norvegicus (Rat) CHAPERONIN SUBUNIT 6A. [MASS=58017]	2	2	Rattus norvegicus (Rat) MANNOSIDASE 2. ALPHA B1. [MASS=114327]				2	2	Rattus norvegicus (Rat) ALPHA ACTININ 4. [MASS=104915]
3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 2 OF INTERLEUKIN ENHANCER-BINDING FACTOR 3. [MASS=97680]	2	3	Rattus norvegicus (Rat) METALLOPROTEINASE INHIBITOR 1 PRECURSOR. [MASS=23794]				2	2	Rattus norvegicus (Rat) SPLICE ISOFORM APP770 OF AMYLOID BETA A4 PROTEIN PRECURSOR (FRAGMENT). [MASS=86704]
3	3	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF REELIN PRECURSOR. [MASS=387631]	2	2	Rattus norvegicus (Rat) CHAPERONIN CONTAINING TCPL SUBUNIT 5. [MASS=59537]				2	2	Rattus norvegicus (Rat) PREDICTED similar to I- KININOGEN 2 PRECURSOR (Fragment). [MASS=72419]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DNA REPLICATION LICENSING FACTOR MCM2. [MASS=102272]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO VESICULAR INTEGRAL-MEMBRANE PROTEIN VIP36 PRECURSOR. [MASS=40393]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK 70KDA PROTEIN 4 LIKE. [MASS=136266]
3	3	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S18. [MASS=17719]	2	2	Rattus norvegicus (Rat) IRON-RESPONSIVE ELEMENT-BINDING PROTEIN 1. [MASS=98128]				2	4	Rattus norvegicus (Rat) TUBULIN BETA-3 CHAIN. [MASS=50419]
3	4	Rattus norvegicus (Rat) HISTIDINE-RICH GLYCOPROTEIN. [MASS=57581]	2	2	Rattus norvegicus (Rat) RIBONUCLEOTIDE REDUCTASE M1. [MASS=90293]				2	2	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 5A-1. [MASS=16701]
3	4	Rattus norvegicus (Rat) HISTONE H1.2. [MASS=21856]	2	2	Rattus norvegicus (Rat) 60S ACIDIC RIBOSOMAL PROTEIN P0. [MASS=34215]				2	4	Rattus norvegicus (Rat) PYRUVATE KINASE. MUSCLE. [MASS=57976]
3	3	Rattus norvegicus (Rat) DYNACTIN-1. [MASS=141930]	2	4	Rattus norvegicus (Rat) AMBP PROTEIN PRECURSOR. [MASS=38851]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PEPTIDOGLYCAN RECOGNITION PROTEIN 2. [MASS=39775]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO REGULATOR OF NONSENSE TRANSCRIPTS 1. [MASS=88226]	2	2	Rattus norvegicus (Rat) SYNTENIN-1. [MASS=32423]				2	2	Rattus norvegicus (Rat) L-LACTATE DEHYDROGENASE B CHAIN. [MASS=36481]
3	3	Rattus norvegicus (Rat) VIGILIN. [MASS=141584]	2	3	Rattus norvegicus (Rat) RECEPTOR-LIKE PROTEIN TYROSINE PHOSPHATASE KAPPA EXTRACELLULAR REGION. [MASS=56159]				2	2	Rattus norvegicus (Rat) IGH-1A PROTEIN. [MASS=51403]
3	4	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L3. [MASS=46005]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEMICENTIN 1. [MASS=639647]				2	4	Rattus norvegicus (Rat) ALPHA-2-HS-GLYCOPROTEIN PRECURSOR. [MASS=37982]
3	3	Rattus norvegicus (Rat) ALPHA-MANNOSIDASE 2. [MASS=131242]	2	3	Rattus norvegicus (Rat) EPITHELIAL-CADHERIN PRECURSOR. [MASS=98715]				2	2	Rattus norvegicus (Rat) SPLICE ISOFORM IIBA OF DYNAMIN-2. [MASS=98246]
3	3	Rattus norvegicus (Rat) PROTOCADHERIN. [MASS=505997]	2	2	Rattus norvegicus (Rat) VASCULAR CELL ADHESION PROTEIN 1 PRECURSOR. [MASS=81246]				2	2	Rattus norvegicus (Rat) SORTILIN PRECURSOR. [MASS=91169]
3	3	Rattus norvegicus (Rat) PROLIFERATION-ASSOCIATED 2G4. 38KDA. [MASS=43657]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CG1841-PA. ISOFORM A. [MASS=52522]				2	3	Rattus norvegicus (Rat) HEMOGLOBIN BETA-1 SUBUNIT. [MASS=15848]
3	5	Rattus norvegicus (Rat) STATHMIN. [MASS=17157]	2	2	Rattus norvegicus (Rat) CLUSTERIN PRECURSOR. [MASS=51375]				2	2	Rattus norvegicus (Rat) TRANSLATIONALLY-CONTROLLED TUMOR PROTEIN. [MASS=19462]
3	3	Rattus norvegicus (Rat) PREDICTED: similar to 60S ribosomal protein L38. [MASS=8215]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 40S RIBOSOMAL PROTEIN S3. [MASS=26630]				2	4	Rattus norvegicus (Rat) ALPHA 2 MACROGLOBULIN CARDIAC ISOFORM. [MASS=163218]

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3	3	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S7. [MASS=22127]	2	2	Rattus norvegicus (Rat) PREDICTED similar to HEAT SHOCK PROTEIN HSP 90-BETA. [MASS=50669]				2	2	Rattus norvegicus (Rat) RAI ALPHA(1)-INHIBITOR 3. VARIANT 1 PRECURSOR. [MASS=165326]
3	3	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(V) CHAIN PRECURSOR. [MASS=184610]	2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L13. [MASS=24178]				2	2	Rattus norvegicus (Rat) PROTEASOME SUBUNIT BETA TYPE 1. [MASS=26479]
3	3	Rattus norvegicus (Rat) HAUSP. [MASS=128431]	2	2	Rattus norvegicus (Rat) ARCADLIN. [MASS=103800]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO IMMUNOGLOBULIN HEAVY CHAIN. [MASS=120447]
3	3	Rattus norvegicus (Rat) PROTOCADHERIN GAMMA SUBFAMILY C. 3. [MASS=101038]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CELLULAR APOPTOSIS SUSCEPTIBILITY PROTEIN. [MASS=110214]				2	2	Rattus norvegicus (Rat) SPLICE ISOFORM B OF AP-1 COMPLEX SUBUNIT BETA-1. [MASS=103873]
3	5	Rattus norvegicus (Rat) NUCLEOLIN. [MASS=77276]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SEMAPHORIN 6D-4. [MASS=159473]				2	3	Rattus norvegicus (Rat) GPI-ANCHORED MEMBRANE PROTEIN 1. [MASS=75707]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO UBIQUITIN SPECIFIC PROTEASE 9. X-LINKED. [MASS=290681]	2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L3. [MASS=46005]				2	2	Rattus norvegicus (Rat) T-COMPLEX PROTEIN 1 SUBUNIT DELTA. [MASS=57968]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ENHANCER-TRAP-LOCUS-1. [MASS=159154]	2	2	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [MASS=67815]				2	2	Rattus norvegicus (Rat) PROTECTIVE PROTEIN FOR BETA-GALACTOSIDASE. [MASS=51216]
3	6	Rattus norvegicus (Rat) PHOSPHOGLYCERATE MUTASE 2. [MASS=28624]	2	2	Rattus norvegicus (Rat) HEAT SHOCK 70 KDA PROTEIN 1A/1B. [MASS=70185]				2	2	Rattus norvegicus (Rat) PREDICTED similar to Proteasome 26S subunit. ATPase 3. [MASS=50509]

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3	5	Rattus norvegicus (Rat) DAMAGE-SPECIFIC DNA BINDING PROTEIN 1. [MASS=127059]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to Slit-like 2. [MASS=72321]				2	2	Rattus norvegicus (Rat) PREDICTED: ADAPTOR- RELATED PROTEIN COMPLEX 1, GAMMA 1 SUBUNIT. [MASS=91693]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SIDEKICK 2. [MASS=466498]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO POLY(RCH)-BINDING PROTEIN 1. [MASS=37498]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HSPC263. [MASS=37041]
3	3	Rattus norvegicus (Rat) PEPTIDYL PROLYL ISOMERASE C. [MASS=23009]	2	2	Rattus norvegicus (Rat) C-REACTIVE PROTEIN PRECURSOR. [MASS=25468]				2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA NAC1.9.2. PROTEIN. [MASS=23384]
3	3	Rattus norvegicus (Rat) TENASCIN (FRAGMENT). [MASS=67815]	2	3	Rattus norvegicus (Rat) PREDICTED similar to FIBRINOGEN, GAMMA POLYPEPTIDE. [MASS=49121]				2	3	Rattus norvegicus (Rat) ALPHA-ACTININ-4. [MASS=104786]
3	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN L28. [MASS=16313]	2	2	Rattus norvegicus (Rat) NEUROSERPIN PRECURSOR. [MASS=46278]				2	2	Rattus norvegicus (Rat) PREDICTED: VON WILLEBRAND FACTOR. [MASS=308474]
2	2	Rattus norvegicus (Rat) ALPHA-ENOLASE. [MASS=46997]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PUTATIVE PRE- MRNA SPLICING FACTOR RNA HELICASE. [MASS=90977]				2	2	Rattus norvegicus (Rat) FATTY ACID-BINDING PROTEIN. BRAIN. [MASS=14733]
2	2	Rattus norvegicus (Rat) PREDICTED similar to T- KININOGEN 2 PRECURSOR (Fragment). [MASS=72419]	2	3	Rattus norvegicus (Rat) SERINE (OR CYSTEINE) PROTEINASE INHIBITOR, CLADE A (ALPHA-1 ANTIPROTEINASE, ANTITRYPSIN), MEMBER 6. [MASS=44671]				2	2	Rattus norvegicus (Rat) GM2 GANGLIOSIDE ACTIVATOR PROTEIN. [MASS=21493]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	3	Rattus norvegicus (Rat) HYRAC. IMASS=31353	2	3	Rattus norvegicus (Rat) HEMOPEXIN PRECURSOR. IMASS=51291				2	2	Rattus norvegicus (Rat) SSB PROTEIN. IMASS=43926
2	2	Rattus norvegicus (Rat) HEAT SHOCK-RELATED 70 KDA PROTEIN 2. IMASS=69528	2	2	Rattus norvegicus (Rat) PREDICTED: BRAIN GLYCOGEN PHOSPHORYLASE. IMASS=96738				2	2	Rattus norvegicus (Rat) MANNOSIDASE-ALPHA CLASS 1A, MEMBER 1. IMASS=73125
2	3	Rattus norvegicus (Rat) PROLIFERATING CELL NUCLEAR ANTIGEN. IMASS=28749	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 40S RIBOSOMAL PROTEIN S9. IMASS=22648				2	2	Rattus norvegicus (Rat) VIGILIN. IMASS=141584
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALPHA ENOLASE. IMASS=27286	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 60S RIBOSOMAL PROTEIN L12. IMASS=17847				2	2	Rattus norvegicus (Rat) PREDICTED-MATRIN-3. IMASS=44733
2	3	Rattus norvegicus (Rat) HYDROXYMETHYLGLUT ARYL-COA SYNTHASE. CYTOPLASMIC. IMASS=57434	2	2	Rattus norvegicus (Rat) SEZ6B. IMASS=105607				2	2	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR. IMASS=86686
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HEAT SHOCK 70KDA PROTEIN 4 LIKE. IMASS=136266	2	2	Rattus norvegicus (Rat) SEMA4B PROTEIN (FRAGMENT). IMASS=79477				2	2	Rattus norvegicus (Rat) EPITHELIAL-CADHERIN PRECURSOR. IMASS=98715
2	2	Rattus norvegicus (Rat) RUVB-LIKE 2. IMASS=51147	2	2	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF NEUROFASCIN PRECURSOR. IMASS=138004				2	2	Rattus norvegicus (Rat) FRUCTOSE-BISPHOSPHATE ALDOLASE C. IMASS=39153
2	3	Rattus norvegicus (Rat) SPLICE ISOFORM 2 OF PLASMINOGEN ACTIVATOR INHIBITOR 1 RNA-BINDING PROTEIN. IMASS=42984	2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLLAGEN ALPHA1 TYPE VI-PRECURSOR. IMASS=130760				2	2	Rattus norvegicus (Rat) TUBULIN BETA CHAIN. IMASS=49963

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) RUVB-LIKE 1. [MASS=50214]	2	2	Rattus norvegicus (Rat) 60S ACIDIC RIBOSOMAL PROTEIN P2. [MASS=11692]				2	2	Rattus norvegicus (Rat) ISOCITRATE DEHYDROGENASE [NADP] CYTOPLASMIC. [MASS=46734]
2	2	Rattus norvegicus (Rat) GLUTATHIONE S- TRANSFERASE P. [MASS=23308]	2	5	Rattus norvegicus (Rat) DERMOCIDIN. [MASS=11284]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EUKARYOTIC TRANSLATION INITIATION FACTOR 4. GAMMA 1 ISOFORM A. [MASS=93472]
2	2	Rattus norvegicus (Rat) MANNOSIDASE. ALPHA. CLASS 1A. MEMBER 1. [MASS=73125]	2	2	Rattus norvegicus (Rat) EPSILON 2 GLOBIN. [MASS=16388]				2	2	Rattus norvegicus (Rat) HEAT SHOCK-RELATED 70 KDA PROTEIN 2. [MASS=69528]
2	2	Rattus norvegicus (Rat) RHO GDP DISSOCIATION INHIBITOR (GDI) ALPHA. [MASS=23407]	2	2	Rattus norvegicus (Rat) TUBULIN BETA CHAIN. [MASS=49963]				2	2	Rattus norvegicus (Rat) KINESIN-LIKE PROTEIN KIF15. [MASS=159554]
2	2	Rattus norvegicus (Rat) SPLICE ISOFORM PYBP1 OF POLYPYRIMIDINE TRACT-BINDING PROTEIN 1. [MASS=56937]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SERINE PROTEASE INHIBITOR 2.4. [MASS=46841]				2	2	Rattus norvegicus (Rat) DAMAGE-SPECIFIC DNA BINDING PROTEIN 1. [MASS=127059]
2	3	Rattus norvegicus (Rat) PREDICTED-HEAT SHOCK PROTEIN HSP 90-BETA (Fragment). [MASS=50669]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COATOMER PROTEIN COMPLEX SUBUNIT ALPHA. [MASS=138360]				2	2	Rattus norvegicus (Rat) HEAT SHOCK 70 KDA PROTEIN 1A/1B. [MASS=70185]
2	2	Rattus norvegicus (Rat) METALLOPROTEINASE INHIBITOR 1 PRECURSOR. [MASS=23794]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to Periostin precursor (PN) (Osteoblast-specific factor 2) (OSF-2). [MASS=90252]				2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GLYCERALDEHYDE-3- PHOSPHATE DEHYDROGENASE. [MASS=35200]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) PREDICTED: NIDOGEN 2. IMASS=173960	2	2	Rattus norvegicus (Rat) SPICE ISOFORM 1 OF MYOSIN-11 (FRAGMENT). IMASS=152492	2			2	3	Rattus norvegicus (Rat) COLLAGEN ALPHA-2(I) CHAIN PRECURSOR. IMASS=129564
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ENO1 PROTEIN. IMASS=47532	2	2	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S10. IMASS=18916	2			2	2	Rattus norvegicus (Rat) EPSILON 3 GLOBIN. IMASS=16540
2	2	Rattus norvegicus (Rat) SORTILIN PRECURSOR. IMASS=91169	2	3	Rattus norvegicus (Rat) HISTIDINE-RICH GLYCOPROTEIN. IMASS=57581	2			2	2	Rattus norvegicus (Rat) HEMOPEXIN PRECURSOR. IMASS=51291
2	3	Rattus norvegicus (Rat) 60S ACIDIC RIBOSOMAL PROTEIN P2. IMASS=11692	2	3	Rattus norvegicus (Rat) RAB GDP DISSOCIATION INHIBITOR BETA. IMASS=50685	2			2	6	Rattus norvegicus (Rat) COLLAGEN ALPHA-1(V) CHAIN PRECURSOR. IMASS=184610
2	3	Rattus norvegicus (Rat) FOLLISTATIN-RELATED PROTEIN 1 PRECURSOR. IMASS=34622	2	2	Rattus norvegicus (Rat) LIVER CARBOXYLESTERASE 1 PRECURSOR. IMASS=60175	2			2	2	Rattus norvegicus (Rat) 1- PHOSPHATIDYLINOSITOL- 4,5-BISPHOSPHATE PHOSPHODIESTERASE GAMMA 1. IMASS=148548
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PSMC6 PROTEIN. IMASS=45797	2	2	Rattus norvegicus (Rat) PREDICTED: TUMOR REJECTION ANTIGEN GP96. IMASS=92771	2			2	5	Rattus norvegicus (Rat) BETA- 2-MICROGLOBULIN PRECURSOR. IMASS=13720
2	2	Rattus norvegicus (Rat) SYNTENIN-1. IMASS=32423	2	2	Rattus norvegicus (Rat) LOC362795 PROTEIN. IMASS=52392	2			2	3	Rattus norvegicus (Rat) STRUCTURAL MAINTENANCE OF CHROMOSOME 1-LIKE 1 PROTEIN. IMASS=143205
2	2	Rattus norvegicus (Rat) INOSINE MONOPHOSPHATE DEHYDROGENASE 2. IMASS=65799	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO UBIQUITIN CARBOXYL-TERMINAL HYDROLASE 5. IMASS=95779	2			2	3	Rattus norvegicus (Rat) T- CADHERIN. IMASS=78086

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2	2	Rattus norvegicus (Rat) PREDICTED: ATPASE, H+ TRANSPORTING, LYSOSOMAL ACCESSORY PROTEIN 2. IMASS=66094	2	2	Rattus norvegicus (Rat) INOSINE MONOPHOSPHATE DEHYDROGENASE 2. IMASS=55799	2			2	2	Rattus norvegicus (Rat) BETA- 2-GLYCOPROTEIN 1 PRECURSOR. IMASS=33197
2	2	Rattus norvegicus (Rat) DNA PRIMASE LARGE SUBUNIT. IMASS=58603	2	2	Rattus norvegicus (Rat) HYPOTHETICAL PROTEIN RGD1305890. IMASS=31776	2			2	2	Rattus norvegicus (Rat) CALCIUM-DEPENDENT SECRETION ACTIVATOR 1. IMASS=146266
2	2	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 9. IMASS=107985	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO BETA- GALACTOSIDASE PRECURSOR. IMASS=73228	2			2	2	Rattus norvegicus (Rat) EUKARYOTIC TRANSLATION INITIATION FACTOR 3 SUBUNIT 9. IMASS=107985
2	2	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF SEX HORMONE- BINDING GLOBULIN PRECURSOR. IMASS=44533	2	2	Rattus norvegicus (Rat) MICROFIBRILLAR- ASSOCIATED PROTEIN 4. IMASS=29050	2			2	2	Rattus norvegicus (Rat) ADAPTOR PROTEIN COMPLEX AP-2, ALPHA 2 SUBUNIT. IMASS=104174
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO COLLAGEN ALPHA1 TYPE VI-PRECURSOR. IMASS=130760	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO LAMININ ALPHA-1 CHAIN PRECURSOR - MOUSE. IMASS=338692	2			2	4	Rattus norvegicus (Rat) NUCLEOSOME ASSEMBLY PROTEIN 1-LIKE 1 IMASS=45373
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 11. IMASS=54019	2	2	Rattus norvegicus (Rat) SPLICEOSOME RNA HELICASE BAT1. IMASS=49035	2			2	2	Rattus norvegicus (Rat) PROTHROMBIN PRECURSOR (FRAGMENT). IMASS=70412
2	2	Rattus norvegicus (Rat) PREDICTED- HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN A1. IMASS=33656	2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L24. IMASS=17779	2			2	2	Rattus norvegicus (Rat) PREDICTED: CADHERIN 11. IMASS=88036

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2	2	Rattus norvegicus (Rat) GUANINE NUCLEOTIDE-BINDING PROTEIN BETA SUBUNIT 2-LIKE 1. [MASS=35419]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO STABILIN-1. [MASS=288663]				2	2	Rattus norvegicus (Rat) M-CADHERIN. [MASS=85753]
2	3	Rattus norvegicus (Rat) PREDICTED: EUKARYOTIC TRANSLATION ELONGATION FACTOR 1 GAMMA. [MASS=72445]	2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 26S PROTEASOME NON-ATPASE REGULATORY SUBUNIT 11. [MASS=54019]				2	2	Rattus norvegicus (Rat) PREDICTED: similar to ubiquitin-activating enzyme E1. [MASS=117931]
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DEAD/H BOX POLYPEPTIDE 36 PROTEIN. [MASS=113843]	2	2	Rattus norvegicus (Rat) PREDICTED: similar to 60S ribosomal protein L29. [MASS=16961]				2	2	Rattus norvegicus (Rat) SPLICEOSOME RNA HELICASE BAT1. [MASS=49035]
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PYRUVATE KINASE 3. [MASS=84928]							2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RANBP4. [MASS=118926]
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HSPC263. [MASS=37041]							2	2	Rattus norvegicus (Rat) PREDICTED: PROCOLLAGEN TYPE XII, ALPHA 1. [MASS=367709]
2	2	Rattus norvegicus (Rat) FIBRILLIN-2. [MASS=313374]							2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SLIT-ROBO RHO GTPASE-ACTIVATING PROTEIN 1. [MASS=133329]
2	2	Rattus norvegicus (Rat) 15 KDA PROTEIN. [MASS=14671]							2	2	Rattus norvegicus (Rat) PREDICTED: HISTONE DEACETYLASE 6. [MASS=168631]
2	2	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF FIBRINOGEN ALPHA CHAIN PRECURSOR. [MASS=86686]							2	5	Rattus norvegicus (Rat) DERMICIDIN. [MASS=11284]

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2	2	<u>Rattus norvegicus (Rat)</u> <u>40S RIBOSOMAL</u> <u>PROTEIN S13.</u> IMASS=17091							2	2	<u>Rattus norvegicus (Rat)</u> <u>TRIOSEPHOSPHATE</u> <u>ISOMERASE.</u> IMASS=26790
2	3	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 1 OF</u> <u>DNA-BINDING PROTEIN</u> <u>A.</u> IMASS=38852							2	2	<u>Rattus norvegicus (Rat)</u> <u>GLUCOSAMINE.</u> IMASS=60914
2	2	<u>Rattus norvegicus (Rat)</u> <u>RETINOL-BINDING</u> <u>PROTEIN I, CELLULAR.</u> IMASS=15703							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO N-</u> <u>TERMINAL</u> <u>ACEYLTRANSFERASE 1.</u> IMASS=100994
2	2	<u>Rattus norvegicus (Rat)</u> <u>TPA: proteasome subunit</u> <u>beta type 6-like.</u> IMASS=26304							2	2	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 2 OF DNA.</u> IMASS=173853
2	2	<u>Rattus norvegicus (Rat)</u> <u>PROTEIN ARGININE N-</u> <u>METHYLTRANSFERASE</u> <u>1.</u> IMASS=42436							2	2	<u>Rattus norvegicus (Rat)</u> <u>PROTEASOME SUBUNIT</u> <u>BETA TYPE 2.</u> IMASS=22912
2	2	<u>Rattus norvegicus (Rat)</u> <u>TRANSLATIONALLY-</u> <u>CONTROLLED TUMOR</u> <u>PROTEIN.</u> IMASS=19462							2	4	<u>Rattus norvegicus (Rat)</u> 14-3-3 <u>PROTEIN THETA.</u> IMASS=27778
2	3	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO STABILIN-1.</u> IMASS=288663							2	2	<u>Rattus norvegicus (Rat)</u> 14-3-3 <u>PROTEIN BETAALPHA.</u> IMASS=27923
2	2	<u>Rattus norvegicus (Rat)</u> <u>60S RIBOSOMAL</u> <u>PROTEIN L7.</u> IMASS=30329							2	2	<u>Rattus norvegicus (Rat)</u> <u>CALMODULIN.</u> IMASS=16706
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO SERINE PROTEASE</u> <u>INHIBITOR 2.4.</u> IMASS=46841							2	2	<u>Rattus norvegicus (Rat)</u> <u>INSULIN-LIKE GROWTH</u> <u>FACTOR-BINDING PROTEIN</u> <u>COMPLEX ACID LABILE</u> <u>CHAIN PRECURSOR.</u> IMASS=66812

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2	2	<u>Rattus norvegicus (Rat)</u> <u>NUCLEOSIDE</u> <u>DIPHOSPHATE KINASE</u> <u>A. [MASS=17193]</u>				2			2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED:</u> <u>CHROMODOMAIN HELICASE</u> <u>DNA BINDING PROTEIN 4.</u> <u>[MASS=222452]</u>
2	2	<u>Rattus norvegicus (Rat)</u> <u>EUKARYOTIC</u> <u>TRANSLATION</u> <u>INITIATION FACTOR 5A-</u> <u>1. [MASS=16701]</u>							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO</u> <u>RIBOSOMAL PROTEIN L6.</u> <u>[MASS=32944]</u>
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED-40S</u> <u>ribosomal protein S17.</u> <u>[MASS=16340]</u>							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO</u> <u>STABILIN-1. [MASS=288663]</u>
2	3	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 2 OF</u> <u>RECEPTOR-TYPE</u> <u>TYROSINE-PROTEIN</u> <u>PHOSPHATASE ZETA</u> <u>PRECURSOR.</u> <u>[MASS=164596]</u>							2	2	<u>Rattus norvegicus (Rat)</u> <u>TENASCIN (FRAGMENT).</u> <u>[MASS=67815]</u>
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO CCR4-NOT</u> <u>TRANSCRIPTION</u> <u>COMPLEX, SUBUNIT 1</u> <u>ISOFORM A.</u> <u>[MASS=93683]</u>							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO</u> <u>LIPOPROTEIN RECEPTOR-</u> <u>RELATED PROTEIN.</u> <u>[MASS=504889]</u>
2	2	<u>Rattus norvegicus (Rat)</u> <u>HEAT SHOCK 70 KDA</u> <u>PROTEIN 1A/1B.</u> <u>[MASS=70185]</u>							2	2	<u>Rattus norvegicus (Rat) ZERO</u> <u>BETA-1 GLOBIN.</u> <u>[MASS=16023]</u>
2	3	<u>Rattus norvegicus (Rat)</u> <u>RECEPTOR-LIKE</u> <u>PROTEIN TYROSINE</u> <u>PHOSPHATASE KAPPA</u> <u>EXTRACELLULAR</u> <u>REGION. [MASS=56159]</u>							2	2	<u>Rattus norvegicus (Rat) GTP-</u> <u>BINDING NUCLEAR PROTEIN</u> <u>RAN. TESTIS-SPECIFIC</u> <u>ISOFORM. [MASS=24451]</u>
2	3	<u>Rattus norvegicus (Rat)</u> <u>NUCLEIC ACID BINDING</u> <u>FACTOR PRM10.</u> <u>[MASS=33815]</u>							2	2	<u>Rattus norvegicus (Rat)</u> <u>COLLAGEN ALPHA-1(III)</u> <u>CHAIN PRECURSOR.</u> <u>[MASS=138936]</u>

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2	2	Rattus norvegicus (Rat) <u>SPLICE ISOFORM APP770 OF AMYLOID BETA A4 PROTEIN PRECURSOR (FRAGMENT).</u> [MASS=86704]							2	2	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO HEPATIC MULTIPLE INOSITOL POLYPHOSPHATE PHOSPHATASE.</u> [MASS=54619]
2	5	Rattus norvegicus (Rat) <u>PREDICTED: similar to Fibulin-1 precursor.</u> [MASS=75381]							2	2	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO MUCIN 17.</u> [MASS=189893]
2	2	Rattus norvegicus (Rat) <u>CADHERIN EGF LAG SEVEN-PASS G-TYPE RECEPTOR 2.</u> [MASS=317122]							2	9	Rattus norvegicus (Rat) <u>SERINE (OR CYSTEINE) PROTEINASE INHIBITOR, CLADE A (ALPHA-1 ANTI TRYPSIN), MEMBER 6.</u> [MASS=44671]
2	2	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO ARX.</u> [MASS=121446]							2	2	Rattus norvegicus (Rat) <u>FARNESYL PYROPHOSPHATE SYNTHETASE.</u> [MASS=40830]
2	4	Rattus norvegicus (Rat) <u>HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN C.</u> [MASS=34385]							2	3	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO HEPARAN SULFATE PROTEOGLYCAN 2.</u> [MASS=377284]
2	2	Rattus norvegicus (Rat) <u>PREDICTED: PROTEASOME (PROSOME), MACROPAIN) SUBUNIT, BETA TYPE 5.</u> [MASS=37128]							2	2	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO ELAV.</u> [MASS=49528]
2	2	Rattus norvegicus (Rat) <u>109 KDA PROTEIN.</u> [MASS=108509]							2	2	Rattus norvegicus (Rat) <u>PREDICTED: SIMILAR TO TUBULIN-SPECIFIC CHAPERONE D.</u> [MASS=60160]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	<u>Rattus norvegicus (Rat)</u> <u>AMBP PROTEIN PRECURSOR</u> [MASS=38851]							2	2	<u>Rattus norvegicus (Rat)</u> <u>COATOMER SUBUNIT BETA</u> [MASS=102420]
2	2	<u>Rattus norvegicus (Rat)</u> <u>PROTEASOME</u> [MASS=60688]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO EXPRESSED SEQUENCE A1314180</u> [MASS=203921]
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN L14</u> [MASS=18408]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO REGULATOR OF NONSENSE TRANSCRIPTS 1</u> [MASS=88226]
2	2	<u>Rattus norvegicus (Rat)</u> <u>LOW-DENSITY LIPOPROTEIN RECEPTOR-RELATED PROTEIN 2 PRECURSOR</u> [MASS=519276]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO SORCSB SPICE VARIANT OF THE VPS10 DOMAIN RECEPTOR SORCS</u> [MASS=129969]
2	2	<u>Rattus norvegicus (Rat)</u> <u>GRP78 BINDING PROTEIN</u> [MASS=110574]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO 40S RIBOSOMAL PROTEIN S19</u> [MASS=16172]
2	3	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO COLLAGEN ALPHA 2(IV) CHAIN PRECURSOR - MOUSE</u> [MASS=192535]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO CYFIP1 PROTEIN</u> [MASS=144933]
2	2	<u>Rattus norvegicus (Rat)</u> <u>60S RIBOSOMAL PROTEIN L7A</u> [MASS=29864]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED similar to FIBRINOGEN, GAMMA POLYPEPTIDE</u> [MASS=49121]
2	3	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED-Proteasome 26S subunit, ATPase 3</u> [MASS=50509]							2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO LAMININ B1</u> [MASS=228429]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR ION-TERMINAL ACEYLTRANSFERASE 1. [MASS=100994]							2	2	Rattus norvegicus (Rat) URIDINE MONOPHOSPHATE SYNTHETASE. [MASS=52379]
2	2	Rattus norvegicus (Rat) O-GLUCNACASE. [MASS=102918]							2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO PROTOCOLADHERIN 18 PRECURSOR. [MASS=123552]
2	2	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S21. [MASS=9127]							2	2	Rattus norvegicus (Rat) ASCC3L1 PROTEIN. [MASS=244875]
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO CYFIP1 PROTEIN. [MASS=144933]							2	2	Rattus norvegicus (Rat) PROLIFERATION- ASSOCIATED 2G4. 38KDA. [MASS=43857]
2	4	Rattus norvegicus (Rat) SPLICE ISOFORM 1 OF 40S RIBOSOMAL PROTEIN S24. [MASS=15423]							2	2	Rattus norvegicus (Rat) I- COMPLEX PROTEIN 1 SUBUNIT ALPHA. [MASS=60360]
2	7	Rattus norvegicus (Rat) DERMCIDIN. [MASS=11284]							2	2	Rattus norvegicus (Rat) INOSINE MONOPHOSPHATE DEHYDROGENASE 2. [MASS=55799]
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 60S RIBOSOMAL PROTEIN L26. [MASS=24366]							2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L7A. [MASS=29864]
2	2	Rattus norvegicus (Rat) PREDICTED: SPLICING FACTOR 3B. SUBUNIT 1. [MASS=152445]							2	2	Rattus norvegicus (Rat) LOW- DENSITY LIPOPROTEIN RECEPTOR PRECURSOR. [MASS=96622]
2	2	Rattus norvegicus (Rat) HAPTOGLOBIN PRECURSOR. [MASS=38549]							2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO NISCHARIN. [MASS=148481]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EXPRESSED SEQUENCE A1314180. [MASS=203921]							2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GTPASE ACTIVATING PROTEIN AND VPS9 DOMAINS 1. [MASS=160359]
2	2	Rattus norvegicus (Rat) ARCADLIN. [MASS=103800]							2	4	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO ALDEHYDE DEHYDROGENASE FAMILY 7, MEMBER A1. [MASS=58749]
2	2	Rattus norvegicus (Rat) EPITHELIAL-CADHERIN PRECURSOR. [MASS=98715]							2	2	Rattus norvegicus (Rat) NUCLEOSIDE DIPHOSPHATE KINASE B. [MASS=17283]
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 60S RIBOSOMAL PROTEIN L7A. [MASS=13842]							2	2	Rattus norvegicus (Rat) COMPLEMENT COMPONENT C6 PRECURSOR. [MASS=105114]
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO NISCHARIN. [MASS=148481]							2	2	Rattus norvegicus (Rat) PREDICTED: TYROSINE KINASE RECEPTOR 1. [MASS=125210]
2	2	Rattus norvegicus (Rat) SPARC PRECURSOR. [MASS=34384]							2	4	Rattus norvegicus (Rat) HEMOGLOBIN ALPHA-1/2 SUBUNIT. [MASS=15197]
2	2	Rattus norvegicus (Rat) SERINE (OR CYSTEINE) PROTEINASE INHIBITOR, CLADE A (ALPHA-1 ANTIPTRYPSIN). MEMBER 6. [MASS=44671]							2	2	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S18. [MASS=17719]
2	2	Rattus norvegicus (Rat) VESICLE ASSOCIATED PROTEIN. [MASS=135350]							2	2	Rattus norvegicus (Rat) SPLICE ISOFORM V0 OF VESICAN CORE PROTEIN PRECURSOR (FRAGMENT). [MASS=300008]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	3	<u>Rattus norvegicus (Rat)</u> <u>HYPOTHETICAL</u> <u>PROTEIN ALDOAL1</u> [MASS=39492]							2	3	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO</u> <u>MAM DOMAIN CONTAINING</u> <u>2</u> . [MASS=68019]
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO EUKARYOTIC</u> <u>TRANSLATION</u> <u>INITIATION FACTOR 4,</u> <u>GAMMA 1 ISOFORM A,</u> [MASS=93472]							2	3	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR TO</u> <u>PUTATIVE E3 LIGASE,</u> [MASS=526904]
2	2	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM CDK2-</u> <u>ALPHA OF CELL</u> <u>DIVISION PROTEIN</u> <u>KINASE 2</u> . [MASS=33887]							2	2	<u>Rattus norvegicus (Rat)</u> <u>INSULIN-LIKE GROWTH</u> <u>FACTOR 1 RECEPTOR</u> <u>PRECURSOR</u> . [MASS=155524]
2	2	<u>Rattus norvegicus (Rat)</u> <u>COMPLEMENT</u> <u>COMPONENT 2,</u> [MASS=83699]							2	2	<u>Rattus norvegicus (Rat)</u> <u>GLUCOSIDASE, ALPHA,</u> <u>ACID</u> . [MASS=106207]
2	2	<u>Rattus norvegicus (Rat)</u> <u>ZINC</u> <u>PHOSPHODIESTERASE</u> <u>ELAC PROTEIN 2,</u> [MASS=92340]							2	2	<u>Rattus norvegicus (Rat)</u> <u>COMPLEMENT COMPONENT</u> <u>1, S SUBCOMPONENT,</u> [MASS=77713]
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO 116 KDA U5 SMALL</u> <u>NUCLEAR</u> <u>RIBONUCLEOPROTEIN</u> <u>COMPONENT,</u> [MASS=109478]							2	3	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 2 OF</u> <u>TROPOMYOSIN BETA CHAIN,</u> [MASS=32958]
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED: SIMILAR</u> <u>TO 40S RIBOSOMAL</u> <u>PROTEIN S16,</u> [MASS=20192]							2	2	<u>Rattus norvegicus (Rat)</u> <u>HYPOTHETICAL PROTEIN</u> <u>ALDOAL1</u> . [MASS=39492]

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) SERINE/THREONINE- PROTEIN PHOSPHATASE 2A CATALYTIC SUBUNIT BETA ISOFORM. [MASS=35575]							2	2	Rattus norvegicus (Rat) DNA POLYMERASE DELTA CATALYTIC SUBUNIT. [MASS=123601]
2	2	Rattus norvegicus (Rat) MATRIN-3. [MASS=94447]							2	4	Rattus norvegicus (Rat) AC2- 008. [MASS=26204]
2	2	Rattus norvegicus (Rat) LEUKEMIA INHIBITORY FACTOR RECEPTOR PRECURSOR. [MASS=122394]							2	2	Rattus norvegicus (Rat) PRX IV. [MASS=31007]
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO POLY(RC)-BINDING PROTEIN 1. [MASS=37498]									
2	2	Rattus norvegicus (Rat) LRRGT00164. [MASS=111258]									
2	2	Rattus norvegicus (Rat) DNA LIGASE 1. [MASS=102482]									
2	2	Rattus norvegicus (Rat) HEMOGLOBIN ALPHA- 1/2 SUBUNIT. [MASS=15197]									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RIBOSOMAL PROTEIN L34. [MASS=13582]									
2	2	Rattus norvegicus (Rat) TRANSKETOLASE. [MASS=71159]									

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	<u>Rattus norvegicus (Rat)</u> <u>SPLICE ISOFORM 1 OF</u> <u>HETEROGENEOUS</u> <u>NUCLEAR</u> <u>RIBONUCLEOPROTEIN</u> <u>M. IMASS=74350</u>									
2	3	<u>Rattus norvegicus (Rat)</u> <u>HISTONE H2A.</u> <u>IMASS=14189</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>40S RIBOSOMAL</u> <u>PROTEIN S25.</u> <u>IMASS=13742</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>HYPOTHETICAL</u> <u>PROTEIN RGD1305890.</u> <u>IMASS=31776</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>SSB PROTEIN.</u> <u>IMASS=43926</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>C-REACTIVE PROTEIN</u> <u>PRECURSOR.</u> <u>IMASS=25468</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>GLUCOSAMINE.</u> <u>IMASS=60914</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>TUBULIN BETA CHAIN.</u> <u>IMASS=49963</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>LEUKOCYTE COMMON</u> <u>ANTIGEN-RELATED</u> <u>PHOSPHATASE</u> <u>PRECURSOR.</u> <u>IMASS=212954</u>									
2	2	<u>Rattus norvegicus (Rat)</u> <u>PREDICTED similar to</u> <u>POSTSYNAPTIC</u> <u>DENSITY PROTEIN.</u> <u>IMASS=186848</u>									

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) COMPLEMENT INHIBITORY FACTOR H. [MASS=140344]									
2	2	Rattus norvegicus (Rat) PROTEASOME SUBUNIT BETA TYPE 2. [MASS=22912]									
2	2	Rattus norvegicus (Rat) 40S RIBOSOMAL PROTEIN S11. [MASS=18431]									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO EIF4G1 PROTEIN. [MASS=175705]									
2	2	Rattus norvegicus (Rat) 92 KDA PROTEIN. [MASS=91785]									
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO RANBP4. [MASS=118926]									
2	7	Rattus norvegicus (Rat) BETA-ENOLASE. [MASS=46830]									
2	2	Rattus norvegicus (Rat) PEROXIREDOXIN-1. [MASS=22109]									
2	3	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO APOLIPOPROTEIN C2. [MASS=10695]									
2	2	Rattus norvegicus (Rat) UDP-N- ACETYLGLUCOSAMINE- -PEPTIDE N- ACETYLGLUCOSAMINYL TRANSFERASE 110 KDA SUBUNIT. [MASS=116954]									

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thV	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO NUCLEAR PORE COMPLEX-ASSOCIATED INTRANUCLEAR COILED-COIL PROTEIN TPR. IMASS=279947									
2	2	Rattus norvegicus (Rat) PROTEASOME SUBUNIT ALPHA TYPE 6. IMASS=27399									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO HCF. IMASS=215082									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO SHPRH PROTEIN. IMASS=192457									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO 60S RIBOSOMAL PROTEIN L12. IMASS=17847									
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO TRANSLIN- ASSOCIATED FACTOR X (TSNAX) INTERACTING PROTEIN 1. IMASS=85228									
2	2	Rattus norvegicus (Rat) JUNCTION PLAKOGLOBIN. IMASS=81801									
2	5	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO GLYCERALDEHYDE- 3-PHOSPHATE DEHYDROGENASE. IMASS=35856									

# of unique peptide s from protein	Total # peptide s	Protein matches E12.5	# of unique peptides from protein	Total # peptide s	Protein matches E14 LV	# of unique peptide s from protein	Total number of peptide s	Protein matches E14 4thv	# of unique peptide s from protein	Total # of peptide s	Protein matches E17.5 LV
2	2	Rattus norvegicus (Rat) PREDICTED: SIMILAR TO DESMOPLAKIN ISOFORM II. [MASS=264186]									
2	2	Rattus norvegicus (Rat) GM2 GANGLIOSIDE ACTIVATOR PROTEIN. [MASS=21493]									
2	2	Rattus norvegicus (Rat) KINESIN-LIKE PROTEIN KIF15. [MASS=159554]									
2	2	Rattus norvegicus (Rat) 29 KDA PROTEIN. [MASS=29242]									
2	2	Rattus norvegicus (Rat) RIBOSOMAL PROTEIN L13A. [MASS=23446]									
2	2	Rattus norvegicus (Rat) 60S RIBOSOMAL PROTEIN L8. [MASS=27893]									
2	2	Rattus norvegicus (Rat) PREDICTED: TYROSINE KINASE RECEPTOR 1. [MASS=125210]									

Parada et al (J Proteome Res, 2005. 4:2420-8) identified 31 proteins within the rat e-CSF finding an abundance of extracellular matrix proteins, enzymes, and enzyme regulators, consistent with our study. We identified a much larger number of proteins within the CSF while identifying 24 of the 31 previously identified proteins. The 7 proteins that we did not find are the following: calreticulin, DJ-1, Eef1 g, laminin receptor 1, malate dehydrogenase 1, set beta isoform, and tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein theta polypeptide. The differences between our study and the study by Parada et al appear a consequence of methodology rather than sample differences. Parada et al chose for mass spectrometry the most prominent silver-stained e-CSF proteins resolved by two-dimensional electrophoresis, whereas we performed an analysis of the entire e-CSF separated by one-dimensional electrophoresis. Our one-dimensional approach enabled a more comprehensive analysis (one which would be unwieldy for an entire two dimensional gel), the study by Parada et al is complementary with this one as some proteins resolved in two dimensions would have a reduced likelihood of becoming suppressed due to co-migration in one dimension with abundant protein species such as albumin.

Our analyses are semi-quantitative, and we identified interesting differences between our various rat e-CSF samples. Apolipoprotein M is found in both E14.5 LV and E14.5 4thV but our analysis did not identify it in either E12.5 LV or E17.5 LV, phosphatidylethanolamine binding protein was found only in the E17.5 LV, collagen alpha 1 (XI) was identified in E14.5 and E17.5 LV, and phosphatase 2 (alpha isoform of regulatory subunit A) was found in E12.5 LV. Also, apolipoprotein D, an apolipoprotein that was not identified by Parada et al was identified only in the E14.5 4thV.

Comparison of human and rat CSF

In a comparison of proteins found in the human e-CSF to the proteins found in the rat e-CSF, we found that of the 188 proteins identified in the

human e-CSF, 135 human proteins were identified in any one of the four samples of embryonic rat CSF. 83 of those proteins were present in all four samples of embryonic rat CSF. Table 1 includes the human proteins found common to rat CSF. We have indicated the specific rat samples in which each
5 protein was identified. Out of the top 50 proteins found in the human CSF, 45 were also found in the rat CSF.

Proteins common to human and rat CSF presumably represent proteins related to fundamental CSF functions. For example, e-CSF contains many transport and carrier proteins including transferrin, albumin, alpha-fetoprotein,
10 transthyretin, ceruloplasmin, and plasma retinol-binding protein that are all involved in either metal ion or vitamin transport through fluid or across cell membranes. There are a number of apolipoproteins involved in the transport and metabolism of lipids and fatty acids in the CSF as reported in this paper and by Parada et al (supra). There are also a large number of enzymes and protease
15 inhibitors in the CSF that are involved in regulating immune response and maintaining homeostasis.

Other proteins common to rat and human CSF may play more specific roles in neurogenesis. One factor in the e-CSF is Amyloid Beta A4 Protein Precursor (APP), which we identified in rat CSF at E12.5, E14.5, and E17.5
20 and human CSF at CS20. This protein is normally present in brain and a soluble form is known to circulate in adult CSF (Palmert et al., Proc Natl Acad Sci USA, 1989. 86:6338-42). The soluble form of APP has been shown to stimulate proliferation of embryonic neural stem cells as well as adult neural progenitor cells from the subventricular zone (Caille et al., Development, 2004.
25 131:2173-81; Hayashi et al., Biochem Biophys Res Commun, 1994. 205:936-43; Ohsawa et al., Eur J Neurosci, 1999. 11:1907-13). APP may play a role during neurogenesis not only within the cell but may be released in the extracellular space and taken up in the CSF in order to diffuse throughout the CSF a play a function at more distant sites. Similarly, Tenascin, which we
30 found in all CSF samples from rat and human from CS 20, is a secreted

extracellular matrix glycoprotein implicated in axon guidance during development and regeneration (von Holst et al., J Biol Chem, 2007. 282: 9172-81), which was recently shown to be expressed in progenitor cells in the ventricular zone of the developing brain. CSF contains multiple critical
5 extracellular matrix factors including fibronectin, laminin, tenascin, fibulin, versican, and neurocan core protein. Because many of these factors can support or orient neuronal migration, they may be acting in the CSF as external cues for proliferating and differentiating neuronal progenitor cells.

Few proteins were identified that may be exclusive to rat or human e-
10 CSF. The protein Pigment Epithelium Derived Factor (PEDF) was only found in the human e-CSF and is known to circulate in the adult CSF and is significantly decreased in CSF of patients with frontotemporal dementia (Davidsson et al., Brain Res Mol Brain Res, 2002. 109:128-33). This secreted serine protease inhibitor, known to be released by retinal pigment cell into the
15 matrix, is a known neurotrophic protein involved in survival and potentially differentiation of specific neurons (Houenou et al., J Comp Neurol, 1999. 412:506-14). PEDF is known to act on photoreceptor cells but also may play a role in spinal motor neuronal survival. It is likely that PEDF is released by the photoreceptor cells into the matrix and taken up by the CSF and may act on cell
20 types and neurons by diffusion through the CSF. Similarly, the Neuronal Cell Adhesion Molecule L1-Like Protein, also found only in the human e-CSF is known to play important roles in neurite outgrowth and neuronal survival (Hillenbrand et al., Eur J Neurosci, 1999. 11:813-26; Montag-Sallaz et al., Mol Cell Biol, 2002. 22:7967-81; Nishimune et al., J Neurosci Res, 2005. 80:593-9).

25 Conversely, we only observed the Extracellular Superoxide Dismutase, a protein known to remove free radicals that can be toxic to cells in rat e-CSF. One of the functions of the e-CSF may be the removal of toxins and toxin metabolic byproducts, and therefore it would important to have proteins within the CSF that help neutralize some of the toxic products released into the CSF.
30 Additionally, we found in the rat e-CSF Mannose 6-phosphate/Insulin-like

Growth Factor II Receptor (IGF2R), a soluble form of the receptor has been found in the serum, amniotic fluid and urine of both rodents and humans, affecting organ size based on its interaction with IGF2 and other factors (Causin et al., *Biochem J*, 1988. 252:795-9; Kiess et al., *Proc Natl Acad Sci USA*, 1987. 84:7720-4; MacDonald et al., *J Biol Chem*, 1989. 264:3256-61; Xu et al., *J Clin Endocrinol Metab*, 1998. 83:437-42; Zaina et al., *J Biol Chem*, 1998. 273:28610-6). Confirmation of these apparent differences would require Western blotting, and may lead to studies of their intriguing biological potential in the e-CSF.

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Subcellular localization of e-CSF proteins

To compare the e-CSF of human and rat further we analyzed the 188 proteins found in the human e-CSF and the 137 proteins in the rat e-CSF present in all samples based on subcellular localization, molecular function, and biological process. The subcellular localization of each protein in the CSF is shown in Tables 1 and 3. The majority of proteins found in the human (Figure 2A) and rat (Figure 2B) e-CSF are secreted proteins which compose 27% and 33% of the total proteins found within the CSF respectively. The second most common localization of proteins found in the e-CSF of both humans and rats are cell membrane proteins, composing 20% and 18% respectively. The relatively high percentage of membrane proteins is consistent with the recent discovery of membrane bound particles in the CSF (Marzesco et al., *J Cell Sci*, 2005. 118:2849-58). Out of 188 proteins found in the human e-CSF, 19% are cytoplasmic proteins, 16% are secreted proteins found in the extracellular space or extracellular matrix (ECM), 14% are nuclear proteins, and 9% are intracellular proteins that could not be specifically localized to one compartment. Out of 137 proteins present in all rat e-CSF samples 14% are cytoplasmic proteins, 15% are ECM proteins, 3% are nuclear proteins, and 12% are intracellular proteins. As a control to assess subcellular localization in a protein population of embryonic brain, we chose to analyze the top 200 proteins

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identified from E16.5 mouse forebrain and midbrain in a previous study (Ballif et al., Mol Cell Proteomics, 2004. 3:1093-101). Figure 2C shows that 42% of these proteins are in the cytoplasm, 22% nuclear, 14% intracellular, 7% at the cell membrane, and 7% mitochondrial. Strikingly no mitochondrial proteins were found in the CSF. Out of the 200 proteins analyzed from embryonic mouse brain, two are secreted and three are found in the extracellular space or matrix. Figure 2D shows a graphical representation of the comparison of embryonic human CSF, rat CSF and mouse brain based on localization. The e-CSF as compared to brain tissue clearly has an abundant number of secreted proteins, extracellular matrix proteins, and cell membrane proteins as opposed to an overwhelming majority of cytoplasmic, nuclear, and mitochondrial proteins found in the brain tissue.

Molecular function and biological process

We used the PANTHER protein ontology database to classify the proteins into distinct categories of molecular function and biological process. Panther identified 180 out of 188 proteins with a total number of 237 functional hits for the human e-CSF, 119 out of 137 proteins with a total number of 155 functional hits for the rat e-CSF, and 191 out of 200 proteins with a total number of 234 functional hits for embryonic mouse brain. Table 1 shows the percentage of proteins assigned to each functional category in the embryonic human CSF, embryonic rat CSF, and E16.5 embryonic mouse brain. Figures 5A-5C represent functional classification of the samples as individual pie charts including the absolute number of proteins assigned to each function group.

Table 5. List of protein categories based on molecular function for embryonic human CSF, rat CSF and mouse brain.

Human CSF	Percent proteins in each category	Rat CSF	Percent proteins in each category	Mouse brain	Percent proteins in each category
Cell adhesion	11.1%	Cell adhesion	12.6%	Cell adhesion	2.60%
Chaperone	5.0%	Chaperone	5.0%	Chaperone	8.40%
Cytoskeletal	7.2%	Cytoskeletal	8.4%	Cytoskeletal	11.50%
Defense/Immunity	8.3%	Defense/Immunity	6.7%	Defense/Immunity	0.00%
Extracellular matrix	15.6%	Extracellular matrix	10.9%	Extracellular matrix	0.50%
Hydrolase	2.2%	Hydrolase	1.7%	Hydrolase	6.30%
Kinase	1.1%	Kinase	2.5%	Kinase	2.60%
Ligase	0.6%	Ligase	0.8%	Ligase	3.70%
Membrane traffic	1.1%	Membrane traffic	0.8%	Membrane traffic	2.60%
Miscellaneous	4.4%	Miscellaneous	3.4%	Miscellaneous	2.60%
Unclassified	7.2%	Unclassified	5.9%	Unclassified	14.70%
Nucleic acid binding	10.0%	Nucleic acid binding	5.0%	Nucleic acid binding	18.30%
Oxidoreductase	2.8%	Oxidoreductase	5.0%	Oxidoreductase	4.70%
Phosphatase	1.1%	Phosphatase	2.5%	Phosphatase	1.60%
Protease	7.2%	Protease	6.0%	Protease	1.60%
Receptor	7.8%	Receptor	10.1%	Receptor	2.10%
Calcium binding	2.8%	Calcium binding	4.2%	Calcium binding	3.70%
Regulatory molecule	13.3%	Regulatory molecule	12.6%	Regulatory molecule	8.40%
Signaling molecule	6.1%	Signaling molecule	6.0%	Signaling molecule	1.60%
Synthase and synthetase	0.6%	Synthase and synthetase	1.0%	Synthase and synthetase	2.60%
Transcription factor	1.1%	Transcription factor	1.0%	Transcription factor	3.70%
Transfer/Carrier	8.3%	Transfer/Carrier	12.6%	Transfer/Carrier	3.70%
Transferase	1.7%	Transferase	1.0%	Transferase	4.70%
Transporter	3.9%	Transporter	3.4%	Transporter	4.70%
Cell junction protein	1.1%	Cell junction protein	0%	Cell junction protein	0%
Lyase	0%	Lyase	0%	Lyase	1.60%
Ion channel	0%	Ion channel	0%	Ion channel	1.60%
Isomerase	0%	Isomerase	1.7%	Isomerase	1.00%

5 Panther analysis of molecular function reveals the majority of proteins found within the human and rat CSF share similar functional categories (Table 4, Figure 3, and Figures 5A-5C). Proteins involved in extracellular matrix function make up, respectively, 16% and 11% of the majority of proteins found in the e-CSF of humans and rats. Other abundant categories of proteins found

10 in the e-CSF include regulatory molecules such as protease inhibitors (human-

13%, rat-13%), cell adhesion proteins (human-11%, rat-13%), nucleic acid binding proteins (human-10%, rat-5%), transfer/carrier proteins (human-8%, rat-13%), immune defense proteins (human-8%, rat-7%), and receptors (human-8%, rat-10%). The total number of enzymes also is a large component of the CSF. The embryonic human CSF has a total of 28 different functional enzymes (16%) and embryonic rat CSF has a total of 23 different functional enzymes (19%). Furthermore, the e-CSF is composed of a large number of different enzyme classes, and is particularly high in proteases (human-7%, rat-6%), and oxidoreductases (human-3%, rat-5%).

10 Panther analysis reveals distinct functional groups of proteins present in the CSF as compared to embryonic tissue. Protein categories in the embryonic human and rat CSF are quite similar and to control for random similarity in categorization based on molecular function we compared the CSF protein samples to a sample of 200 most abundant proteins in embryonic E16.5 mouse brain (Table 4). The comparison of relevant protein categories in each sample is shown in Figure 3. The two largest categories of proteins in the embryonic mouse brain include nucleic acid binding proteins (18.3%) and cytoskeletal proteins (11.5%). Interestingly, proteins involved in defense and immunity which comprised 7-8% of e-CSF were completely absent from the top 200 proteins in the embryonic mouse brain sample. One category of proteins that appears to be similar in all three comparisons is the regulatory molecules (13.3% in human CSF, 12.6% in rat CSF, and 8.4% in mouse brain). We further classified the regulatory molecules into smaller categories and although the larger classification shows similar percentages of regulatory molecules, the sub-classification clearly distinguishes the e-CSF samples from the embryonic brain sample (Figure 7). The majority of proteins in the e-CSF within the regulatory molecule class are sub-classified as protease inhibitors comprising 75% and 87% of proteins within the class in human and rat CSF respectively as compared to 0% in the mouse brain (Figure 7). Based on molecular function the most abundant classes of protein present in the e-CSF are found to be

proteins of the extracellular matrix, regulatory molecules, transfer/carrier proteins, cell adhesion proteins, and proteins involved in immunity and defense.

Panther analysis of proteins based on biological process reveals strong similarity between the embryonic human and rat CSF and differences between the CSF and the embryonic brain (Table 6, Figure 4, and Figures 6A-6C). The five most abundant classes in both embryonic human and rat CSF are protein metabolism and modification, signal transduction, immunity and defense, cell adhesion, and developmental processes. The majority of proteins in the analysis of the embryonic mouse brain are involved in protein metabolism and modification, nucleic acid metabolism, intracellular protein traffic, cell cycle, and cell structure and motility. Comparing the analysis of the mouse brain with the e-CSF shows that the CSF samples contain proteins that are enriched for a number of various biological processes that are distinct from that of embryonic brain tissue (Figure 4). Interestingly, all three samples are most abundant in proteins involved in protein metabolism and modification (Figure 4). However, Panther analysis shows that CSF and brain show different types of proteins even among the same overall class (Figure 8). Sub-classification of this category reveals the majority of proteins in the mouse brain involved in protein biosynthesis (30%) and protein modification (28%) with only 19% of proteins involved in proteolysis (Figure 8). However in both the human and rat e-CSF the overwhelming majority of proteins in both samples are involved in proteolysis comprising 58% in humans and 54% in rats (Figure 8). This class of biological processes includes the large number of protease inhibitors and proteases found within the CSF.

Table 6. List of protein categories based on biological process for embryonic human CSF, rat CSF and mouse brain.

Human CSF	Percent proteins in each category	Rat CSF	Percent proteins in each category	Mouse brain	Percent proteins in each category
Neuronal activities	0.6%	Neuronal activities	0.8%	Neuronal activities	1.60%
Signal transduction	25.0%	Signal transduction	26.1%	Signal transduction	8.90%

Developmental processes	16.1%	Developmental processes	16.8%	Developmental processes	7.30%
Cell proliferation and differentiation	4.4%	Cell proliferation and differentiation	6.7%	Cell proliferation and differentiation	3.70%
Coenzyme and prosthetic group metabolism	0.6%	Coenzyme and prosthetic group metabolism	1.7%	Coenzyme and prosthetic group metabolism	1.60%
Cell structure and motility	13.9%	Cell structure and motility	16.0%	Cell structure and motility	10.50%
Immunity and defense	22.2%	Immunity and defense	18.5%	Immunity and defense	4.20%
Apoptosis	2.8%	Apoptosis	2.5%	Apoptosis	3.10%
Oncogenesis	2.2%	Oncogenesis	3.4%	Oncogenesis	2.10%
Muscle contraction	0.6%	Muscle contraction	0.8%	Muscle contraction	0.50%
Transport	8.9%	Transport	15.1%	Transport	9.40%
Blood circulation and gas exchange	5.0%	Blood circulation and gas exchange	5.9%	Blood circulation and gas exchange	0.50%
Carbohydrate metabolism	1.1%	Carbohydrate metabolism	1.7%	Carbohydrate metabolism	3.70%
Nucleoside, nucleotide and nucleic acid metabolism	10.6%	Nucleoside, nucleotide and nucleic acid metabolism	5.0%	Nucleoside, nucleotide and nucleic acid metabolism	18.80%
Homeostasis	0.6%	Homeostasis	2.5%	Homeostasis	1.60%
Protein metabolism and modification	27.8%	Protein metabolism and modification	27.7%	Protein metabolism and modification	24.60%
Cell cycle	6.7%	Cell cycle	7.6%	Cell cycle	11.00%
Intracellular protein traffic	9.4%	Intracellular protein traffic	11.8%	Intracellular protein traffic	13.10%
Cell adhesion	20.0%	Cell adhesion	17.6%	Cell adhesion	1.60%
Lipid, fatty acid and steroid metabolism	3.3%	Lipid, fatty acid and steroid metabolism	5.9%	Lipid, fatty acid and steroid metabolism	3.10%
Sensory perception	1.1%	Sensory perception	1.7%	Sensory perception	0.50%
Electron transport	0.6%	Electron transport	0.8%	Electron transport	1.00%
Amino acid metabolism	0.6%	Amino acid metabolism	0.8%	Amino acid metabolism	1.00%
Biological process unclassified	5.0%	Biological process unclassified	5.0%	Biological process unclassified	15.20%
Protein targeting and localization	2.2%	Protein targeting and localization	2.5%	Protein targeting and localization	4.20%
Miscellaneous	1.1%	Miscellaneous	0.8%	Miscellaneous	1.60%
Phosphate metabolism	0.0%	Phosphate metabolism	0.0%	Phosphate metabolism	0.50%
Other metabolism	0.0%	Other metabolism	0.0%	Other metabolism	1.00%

The similarities between the embryonic human and rat CSF are apparent when the proteins are classified into groups and analyzed on the basis of

subcellular localization, molecular function, and biological process. Based on the functional characteristics of the proteins found in the e-CSF, the CSF is a heterogeneous mixture of many types of classes of proteins with varying functions. The e-CSF is far more complex than previously thought. This may
5 be due to active secretion from the choroid plexus into the CSF, or from the contents within the extracellular membrane bound particles that are present in the rodent CSF during development, or potentially to aposomes budding from the choroid plexus and floating within the CSF that have been shown previously to support protein translation (Saunders et al., Cell Mol Neurobiol,
10 2000. 20:29-40; Agnew et al., Cell Tissue Res, 1980. 208:261-81; Gudeman et al., J Neurosci Res, 1989. 24:184-91).

Although we did not find the growth factor FGF-2 as reported by Martin et al (Dev Biol, 2006. 297:402-16), many growth factors are in low abundance and are of smaller molecular weight making them more challenging to identify
15 by multiple peptide assignments using mass spectrometry on a complex mixture.

Cortical explants in e-CSF

Cortical explants can survive and proliferate in the presence of e-CSF.
20 Embryonic day 16 (E16) rat cortical explants cultured with 100% E17 CSF for 24 hours, without additional exogenous media or factors, retained tissue architecture, cell proliferation, and cell viability, approximating in vivo E17 rat cortex (Figures 9B, 9C, 9E, and 9F). In contrast, culturing E16 explants with 100% artificial CSF (ACSF) failed to maintain the integrity of the embryonic
25 cortical tissue, as reflected by decreased proliferation and mitotic activity, disorganized neuronal morphology, and a striking increase in cell death (Figures 9D and 9G and Figures 10A-10F). Thus, the embryonic CSF proteome provides an endogenous signaling milieu of essential growth and survival factors for the developing cortex.

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Comparison of E13 and E17 rat e-CSF

The primary source of CSF is the choroid plexus, a highly vascularized secretory epithelial tissue that extends into the ventricles. To determine if the embryonic choroid-plexus-derived-CSF provides support and instructive cues to the developing cortex we compared CSF from E13 embryos (pre choroid plexus formation) with that from E17 embryos (post choroid plexus formation). E17 CSF increased the frequency of PH3-labeled proliferating cells in E16 cortical explants compared to explants cultured with E13 CSF (E17 mean: 44.1 ± 1.43 ; E13 mean: 25 ± 4.2 ; $n = 4$; $p < 0.05$) (Figures 9H, 9I, and 9N) with a greater than 2.5-fold increase in PH3-positive-staining cells along the ventricular zone (VZ) (E17 mean: 32.3 ± 0.79 ; E13 mean: 12.8 ± 3.9 ; $n = 4$, $p < 0.05$) (Figure 9O). To determine the identity of mitotic cells, explants were stained with an anti-phosphorylated Vimentin 4A4 antibody, an established marker of proliferating neural progenitor cells (Anthony et al., Neuron 41, 881-90 (2004); Weissman et al., Cereb Cortex 13, 550-9 (2003)). E16 explants cultured in E17 CSF revealed increased Vimentin 4A4-positive-staining cells per explant compared to explants grown in E13 CSF (E17 mean: 38.4 ± 1.1 ; E13 mean: 13.9 ± 2.2 ; $n = 3$, $p < 0.05$) (Fig. 1j, k, p). No difference in the number of Tbr2-positive-staining cells undergoing division was observed (data not shown). Taken together, these data suggest that age-dependent differences in embryonic CSF signals are both supportive and instructive for precursor proliferation in the developing cortex.

CSF was then determined to maintain and stimulate proliferation of primary dissociated cortical progenitors cultured as neurospheres, an in vitro experimental model for neural stem cells. Primary neurospheres derived from E14 rat embryos were dissociated, plated at clonal density, and cultured with CSF collected from E13 or E17 embryos. Both E13 and E17 CSF supported the generation of small neurospheres composed primarily of GLAST-positive-staining cells in the absence of supplemental FGF and EGF for 10 days in vitro (DIV)(Figures 9Q-9Y). Neurospheres failed to form in the presence of ACSF.

Consistent with our explant experiments, cells cultured in E17 CSF generated not only increased numbers of neurospheres (Figure 9Z), but also larger spheres (data not shown), indicating that E17 CSF contains instructive proliferative signals. In addition, neurospheres grown in CSF retained responsiveness to FGF and EGF, indicating that the CSF is maintaining the stem cells in an uncommitted fate (Figures 11A-11I).

Both E13 and E17 CSF maintain viable GLAST-positive-staining neurospheres (Figures 12A-12G) after 44 DIV, while E17 CSF promoted the survival of an increased number of neurospheres compared to E13 CSF. Thus, embryonic CSF is sufficient for maintaining and stimulating proliferating cortical progenitor cells.

We next characterized the embryonic CSF proteome to determine how the CSF drives the proliferation of cortical progenitor cells. Total CSF protein concentration increased from E12 on, peaked at birth (P0) and declined into adulthood (Figure 13A). We visualized the overall protein composition of CSF by silver staining, and observed a graded transition of CSF constituents from E13 to adulthood (Figure 13B). Immunoblot analysis of proteins identified by tandem mass spectrometry (LC-MS/MS) (Zappaterra et al., J Proteome Res 6, 3537-48 (2007)) revealed dynamic changes in different classes of proteins in CSF during development (Figure 13C and data not shown). For example, several proteins known to regulate proliferation of neural progenitors including transferrin, cystatin C, FGF2, and soluble isoforms of amyloid precursor protein (sAPP) were expressed throughout development and, in some cases, in the adult CSF (Figure 13C). Other proteins involved in tissue homeostasis, such as the antioxidant and free radical scavenger extracellular super oxide dismutase (EC-SOD, Sod3), and the protease Cathepsin B were robustly expressed early in development and rapidly downregulated thereafter (Figure 13C). Together with the CSF proteome, these proteins contribute to the role of CSF in development by providing essential growth-promoting cues to the developing cortex.

To investigate the distinct effects of embryonic CSF at different developmental stages, we performed extensive LC-MS/MS analyses on increased volumes of E17 CSF. From these E17 rat proteome analyses, we identified several peptides corresponding to Insulin-like growth factor 2 (IGF2) in the CSF (Figure 14A and Table 7). IGF2 is a particularly compelling CSF resident protein given the crucial role of IGF signaling in prenatal growth and brain size, as well as in regulating neural progenitor cell division (Randhawa et al., Mol Genet Metab 86, 84-90 (2005); Hodge et al., J Neurosci 24, 10201-10 (2004); Baker et al., Cell 75, 73-82 (1993)). IGF2 is also essential in the embryonic stem (ES) cell niche (Bendall et al., Nature 448, 1015-21 (2007)). Interestingly, we found that IGF2 is transiently expressed in the CSF during development. IGF2 was first detected at E13 and maximally expressed during cortical neurogenesis (E15-E19), after which its expression declined postnatally (Figure 14B). The dynamic availability of Igf2 in the embryonic CSF raised the possibility that IGF signaling may contribute to the differential capacity of embryonic CSF between E13 and E17 to support cortical neural progenitor proliferation (Bendall et al., supra). We therefore sought to characterize the role IGF2 in neural development, as outlined below.

Table 7

Protein	MW	Protein	MW	Protein	MW	Protein	MW
14-3-3 protein beta/alpha	28037	Apolipoprotein E precursor	35810	L-lactate dehydrogenase B chain	36766	PREDICTED: similar to OTTHUMP00000065631	650022
14-3-3 protein epsilon	29345	Apolipoprotein M precursor	21855	LOC367586 protein	51633	PREDICTED: similar to Phosphoglycerate kinase 1	43632
14-3-3 protein gamma	28342	Ba1-667	109614	LOC500183 protein	26034	PREDICTED: similar to poly(rC) binding protein 2	35269
14-3-3 protein theta	28063	Beta-1,3-N-acetylglucosaminyl-transferase lunatic fringe	42471	LRRGT00147	108859	PREDICTED: similar to Poly(rC)-binding protein 1 (Alpha-CP1) (hnRNP-E1)	38011

14-3-3 protein zeta/delta	27942	Beta-2-glycoprotein I precursor	34338	Lysozyme	17186	PREDICTED: similar to procollagen, type IX, alpha 1	117067
18 kDa protein	18663	Beta-2-microglobulin precursor	13834	Mannose-binding protein associated serine protease-1	81703	PREDICTED: similar to Proteasome subunit alpha type 7-like	34868
20 kDa protein	20033	Calcyclin binding protein	26655	Masp1 protein	45168	PREDICTED: similar to purine-nucleoside phosphorylase	32587
21 kDa protein	21585	cAMP-dependent protein kinase type I-alpha regulatory subunit	43191	Matrix Gla-protein precursor	12208	PREDICTED: similar to pyrophosphatase	33227
26S protease regulatory subunit 8	45797	Carbonic anhydrase 2	29153	Metalloproteinase inhibitor 1 precursor	24478	PREDICTED: similar to RAB5B protein	35237
29 kDa protein	29540	Casein kinase II, alpha chain	45187	Metalloproteinase inhibitor 2 precursor	25041	PREDICTED: similar to ribosomal protein L14	18522
31 kDa protein	31415	Cathepsin B, preproprotein	38457	Multifunctional protein ADE2	47706	PREDICTED: similar to RIKEN cDNA 4732495G21 gene	42305
32 kDa protein	32525	Cathepsin L precursor	38231	Neurexin-2-alpha precursor	18739	PREDICTED: similar to Tubulin alpha-2 chain 2 (Alpha-tubulin 2)	50964
32 kDa protein	32833	Cathepsin Z precursor	34879	Neutrophil antibiotic peptide NP-4 precursor	10452	PREDICTED: similar to tubulin, beta, 2	44993
33 kDa protein	32943	Cd81 protein	26589	NG,NG-dimethylarginine dimethylaminohydrolase 1	31694	PREDICTED: similar to Vesicular integral-membrane protein VIP36 precursor (Lectin, mannose-binding	40735
35 kDa protein	35005	Cell division control protein 2 homolog	34191	Nuclear migration protein nudC	38412	PREDICTED: similar to thrombospondin	124213
35 kDa protein	35717	Cfh protein	46732	Pancreatic triacylglycerol lipase precursor	52181	Proliferating cell nuclear antigen	29091
35 kDa protein	35586	Cofilin-1	25102	Peptidyl-prolyl cis-trans isomerase A	17971	Proliferation-associated 2G4, 38kDa	43999
38 kDa protein	38434	Collagen alpha 1(V) chain precursor	18529	Peptidyl-prolyl cis-trans isomerase 2B precursor	23859	Protein convertase subtilisin/kexin type 9	82452

38 kDa protein	38434	Collagen alpha 1(XI) chain precursor	17189	Peptidylprolyl isomerase C	23066	Proteasome (Prosome, macroPain) subunit, beta type 4	25908
38 kDa protein	38510	Collagen alpha 2(I) chain precursor	13007	Peroxioredoxin 1	22337	Proteasome subunit alpha type 2	25909
39 kDa protein	39428	Collagen alpha 2(I) chain precursor	13007	Peroxioredoxin 2	21823	Proteasome subunit alpha type 3-like	28639
40S ribosomal protein S11	18602	Collagen alpha1	13891	Phosphatidylethanolamine-binding protein	20784	Proteasome subunit alpha type 4	29783
40S ribosomal protein S3	26845	Complement C1q subcomponent, B chain precursor	26817	Phosphoglycerate kinase 1	44937	Proteasome subunit alpha type 6	27856
40S ribosomal protein S3a	30042	Complement C1q subcomponent, C chain precursor	25971	Phosphoglycerate kinase 2	45409	Proteasome subunit beta type 1	26707
40S ribosomal protein S4, X isoform	29694	Connective tissue growth factor precursor	39981	Phosphoglycerate mutase 1	28571	Proteasome subunit beta type 2	23083
40S ribosomal protein S5	22918	Creatine kinase B-type	42997	Phosphoglycerate mutase 2	28795	Proteasome subunit beta type 6-like	25532
40S ribosomal protein S6	28851	Cystatin C	15665	Phosphoserine aminotransferase 1	40969	Proteasome subunit beta type 7 precursor	30269
40S ribosomal protein S7	22127	Cytosolic malate dehydrogenase	36654	Plasma glutathione peroxidase precursor	25678	Protein arginine N-methyltransferase 1	43063
40S ribosomal protein S8	24359	DJ-1 protein	20202	Platelet-activating factor acetylhydrolase IB alpha subunit	47109	Prothrombin precursor	71837
40S ribosomal protein SA	32807	EGF-containing fibulin-like extracellular matrix protein 2	46847	PREDICTED: ATPase, H ⁺ transporting, lysosomal accessory protein	66492	Ras-related protein Rab-10	23086
42 kDa protein	42846	Elongation factor 1-alpha 1	50456	PREDICTED: dystroglycan 1	97048	Ras-related protein Rab-11B	24471
43 kDa protein	45093	Epsilon 1 globin	16161	PREDICTED: eukaryotic translation elongation factor 1 gamma	73357	Ras-related protein Rab-14	24155
45 kDa protein	44917	Epsilon-sarcoglycan	50239	PREDICTED: Glycoprotein-4-beta-galactosyltransferase 2	44883	Ras-related protein Rab-8B	23774

45 kDa protein	45796	Eukaryotic translation initiation factor 2 subunit 1	36262	PREDICTED: multiple inositol polyphosphate histidine phosphatase 1	73188	Rho GDP dissociation inhibitor (GDI) alpha	23464
45 kDa protein	45796	Eukaryotic translation initiation factor 3, subunit 3 gamma, 40kDa	40076	PREDICTED: nidogen 2 (predicted)	176810	Ribose-phosphate pyrophosphokinase I-like	35319
45 kDa protein	45796	Extracellular superoxide dismutase [Cu-Zn] precursor	27019	PREDICTED: procollagen type XI alpha 1	182884	Serine/threonine protein phosphatase 2A, catalytic subunit, alpha isoform	36178
46 kDa protein	46534	FAM3C-like protein	24999	PREDICTED: proteasome (prosome, macropain) subunit, beta type 5	37413	Serine/threonine protein phosphatase PP1-alpha catalytic subunit	38253
47 kDa heat shock protein precursor	46631	Fatty acid-binding protein, brain	15018	PREDICTED: retinol binding protein 4, plasma	50766	Serum albumin precursor	70715
50 kDa protein	50675	Fetuin-B precursor	42388	PREDICTED: serine (or cysteine) proteinase inhibitor, clade F, member 2 (predicted)	62084	Similar to Ras-related protein Rab-1B	22348
50 kDa protein	50450	Fructose-bisphosphate aldolase A	39677	PREDICTED: similar to 25 kDa FK506-binding protein	25236	Soluble calcium-activated nucleotidase 1	45715
51 kDa protein	51503	Fructose-bisphosphate aldolase C	39551	PREDICTED: similar to 40S ribosomal protein S9	22761	SPARC precursor	35297
60S acidic ribosomal protein P0	34386	Galactokinase 1	42832	PREDICTED: similar to 60S ribosomal protein L7	25560	Splice Isoform 1 of Alpha-fetoprotein precursor	70211
60S ribosomal protein L11	20349	Gelsolin	86856	PREDICTED: similar to 60S ribosomal protein L8	28385	Splice Isoform 1 of Fibronectin precursor	276159
60S ribosomal protein L15	24129	Glutathione S-transferase P	23536	PREDICTED: similar to 60S ribosomal protein L9	21971	Splice Isoform 1 of Heterogeneous nuclear ribonucleoprotein D0	38363
60S ribosomal protein L5	34555	Glyceraldehyde-3-phosphate dehydrogenase	36079	PREDICTED: similar to Ab2-076	79786	Splice Isoform 1 of Sex hormone-binding globulin	44875

						precursor	
60S ribosomal protein L7	30386	GTP-binding nuclear protein Ran	24594	PREDICTED: similar to actin related protein 2/3 complex subunit 2	39999	Splice Isoform 3 of Agrin precursor	214603
90 kDa protein	90936	GTP-binding nuclear protein Ran, testis-specific isoform	24622	PREDICTED: similar to Actin, cytoplasmic 2 (Gamma-actin)	62610	Splice Isoform Long of Hyaluronan and proteoglycan link protein 1 precursor	40889
Aa1064	53807	Guanine nucleotide-binding protein beta subunit 2-like 1	35875	PREDICTED: similar to alpha 3 type VI collagen isoform 1 precursor	37083	Splice Isoform RC6-IL of Proteasome subunit alpha type 7	28497
Ab2-076	10427	Guanine nucleotide-binding protein G(I)/G(S)/G(T) beta subunit 1	38044	PREDICTED: similar to Alpha enolase (2-phospho-D-glycerate hydro-lyase) (Non-neural enolase) (NNE)	47602	Spliceosome RNA helicase Bat1	49491
Ab2-379	62360	Hemoglobin alpha-1 and alpha-2 chains	15368	PREDICTED: similar to Alpha enolase (2-phospho-D-glycerate hydro-lyase) (Non-neural enolase) (NNE)	46831	Spp-24	23455
Ac1873	87398	Hemoglobin beta chain, major-form	15962	PREDICTED: similar to alpha NAC/1.9.2. protein	23384	Stathmin	17157
Actin, alpha skeletal muscle	42393	Hemoglobin beta chain, minor-form	15965	PREDICTED: similar to Alpha-centractin (Centractin) (Centrosome-associated actin homolog) (Actin-RP	51683	Syntenin-1	32651
Actin, gamma-enteric smooth muscle	42276	Heterogeneous nuclear ribonucleoprotein A1	34252	PREDICTED: similar to Apolipoprotein C2	10695	TGF-beta receptor type III precursor	95072
Adenine phosphoribosyltransferase	20049	Heterogeneous nuclear ribonucleoprotein C	32914	PREDICTED: similar to cofilin	18823	Thrombospondin 1	133664
Adenosylhomocysteinase	47920	Heterogeneous nuclear ribonucleoprotein F	46072	PREDICTED: similar to collagen alpha 2(IV) chain precursor - mouse	19464	Transcobalamin 4 precursor	47876

ADP-ribosylation factor 3	20526	Hypothetical LOC315594	32346	PREDICTED: similar to ELAV (embryonic lethal, abnormal vision, Drosophila)-like 1 (Hu antigen R)	49756	Transforming protein RhoA	22124
ADP-ribosylation factor 4	20379	Hypothetical LOC316842	35039	PREDICTED: similar to Glyceraldehyde-3-phosphate dehydrogenase (GAPDH)	38691	Translationally controlled tumor protein	19576
ADP-ribosylation factor 6	20065	Hypothetical LOC363644	33553	PREDICTED: similar to glyceraldehyde-3-phosphate dehydrogenase (phosphorylating) (EC 1.2.1.12) - m	22732	Transthyretin precursor	15834
Alcohol dehydrogenase	36602	Hypothetical protein	59591	PREDICTED: similar to glycosyltransferase 28 domain containing 1	54235	Triosephosphate isomerase	27303
Aldose reductase	36122	Hypothetical protein	37353	PREDICTED: similar to heparan sulfate proteoglycan 2 (perlecan)	506188	Tubb3 protein	50875
Alpha-1-antiproteinase precursor	46306	Hypothetical protein	34736	PREDICTED: similar to heterogeneous nuclear ribonucleoprotein A0	102890	Tubulin alpha-1 chain	50820
Alpha-2 antiplasmin	46522	Hypothetical protein LOC311078	34748	PREDICTED: similar to heterogeneous nuclear ribonucleoprotein D-like	46478	Tubulin alpha-3 chain	50644
Alpha-2-globin chain	15456	Hypothetical protein RGD1308228_predicted	33918	PREDICTED: similar to heterogeneous nuclear ribonucleoprotein H3 isoform a	40077	Tubulin beta-5 chain	50127

Alpha-2-HS-glycoprotein precursor	38781	HYRAC	32094	PREDICTED: similar to Heterogeneous nuclear ribonucleoproteins A2/B1 (hnRNP A2 / hnRNP B1)	37486	Tubulin, beta, 2	50257
AMBP protein precursor	39763	Ig lambda-2 chain C region	25750	PREDICTED: similar to High mobility group protein 1 (HMG-1) (Amphoterin) (Heparin-binding protein p	25049	Type A/B hnRNP p38	30967
AMBP protein precursor	39763	Insulin-like growth factor binding protein 2 precursor	33966	PREDICTED: similar to IGFBP-like protein	29708	Ubiquitin carboxyl-terminal hydrolase isozyme L1	25180
Angiotensin II type 1A receptor associated protein	57615	Insulin-like growth factor binding protein 4 precursor	28886	PREDICTED: similar to immunoglobulin light chain	26598	Ubiquitin-like 1	38969
Angiotensinogen precursor	52209	Insulin-like growth factor II precursor	20542	PREDICTED: similar to keratin 6 alpha	64111	Vascular endothelial cell specific protein 11	41763
APEX	32752	Isocitrate dehydrogenase [NADP] cytoplasmic	47076	PREDICTED: similar to mKIAA1631 protein	15185	Vimentin	53658
Apolipoprotein A-I	30119	Lactadherin precursor	48553	PREDICTED: similar to myosin-VIIb	30738	Vitamin D-binding protein precursor	55141
Apolipoprotein A-II precursor	11496	LIM and SH3 domain protein 1	30369	PREDICTED: similar to OTTHUMP00000060196	29822	Zero beta-1 globin	16079
Apolipoprotein A-IV precursor	44456	L-lactate dehydrogenase A chain	36735				

IGF2 in the CSF

To test if CSF could serve as a vehicle for IGF signaling, we assessed the expression of *IGF1* and *IGF2* mRNA in the developing cortex. *IGF2* mRNA was highly expressed in the choroid plexus of E17 rat embryos, as well as in vascular endothelial cells and the leptomeninges of both E14 and E17 rat brain (Figures 14C and 14D). *IGF1* and *IGF2* mRNA was not detected levels

(data not shown) in developing neural progenitor cells or the cortical mantle, as has been previously reported (Ayer-le Lievre et al., Development 111, 105-15 (1991)). While vascular sources of signaling molecules are important for neural progenitor cell fate (Shen et al. Science 304, 1338-40 (2004); Palmer et al., J Comp Neurol 425, 479-94 (2000)), our IGF2 expression data suggests that
5 the choroid plexus is the primary source of IGF2 in the CSF.

To determine if CSF-borne IGF2 has the capacity to stimulate IGF signaling in the developing cortex, we first examined the localization of the IGF1 receptor (IGF1R) in the developing cortex. IGF1R, which binds IGF2
10 and is essential for the proliferative response to IGF signaling (references), localized to the apical, ventricular surface of radial neuroepithelial cells that contacts the CSF (Figure 14E). Further, embryonic CSF activated IGF signaling in primary cortical precursor cells and neurons via the IGF1 receptor, as reflected by induction of phosphorylated IGF1R β (p-IGF1R β) (Figure 14F).
15 Embryonic CSF also stimulated the activation of the AKT and MAPK signaling pathways (Figure 14F), both downstream targets of IGF signaling as well as other growth-factor-stimulated signaling cascades. IGF2 treatment alone induced IGF signaling similar to embryonic CSF (Figure 14F). Thus, cortical progenitor cells appropriately express cell surface receptors required to engage
20 CSF-borne cues such as IGF2, and reciprocally, CSF-borne IGF2 is capable of inducing the activation of IGF signaling in cortical progenitor cells (Hodge et al., J Neurosci 24, 10201-10 (2004); Dudek et al., Science 275, 661-5 (1997); Hodge et al., Int J Dev Neurosci 25, 233-41 (2007)).

We then tested whether Igf2 could maintain GLAST-positive cortical
25 progenitor cells in vitro by culturing primary neurosphere dissociated cells with Igf2 (Figure 15A). Interestingly, cells cultured in IGF2 formed small GLAST-positive-staining neurospheres (Figures 15A-15C) indicating that IGF2 alone provides a modest proliferative signal and that cells retain their neural progenitor cell fate in the presence of IGF2. We then determined whether IGF2
30 is both necessary and sufficient to induce maintenance and proliferation of

neural progenitor cells along the ventricular zone in cortical explants. E16 cortical explants grown in E17 CSF control conditions showed numerous Vimentin 4A4-labeled, proliferating cells along the ventricle (Figure 15E). In contrast, E16 explants cultured in E17 CSF and in the presence of an IGF2 neutralizing antibody (IGF2 NAb) revealed a striking decrease of Vimentin 4A4-labeled-cells along the ventricle (Figures 15E-15G) (E17 control mean: 28.8 ± 4.3 ; E17 Igf2 neutralizing antibody mean: 13.9 ± 2.0 ; $n = 4$, $p < 0.05$). In addition, addition of IGF2 (2 ng/ml) to Neural Basal Media (NBM) plus 20% ACSF stimulated the proliferation of Vimentin 4A4 positive progenitor cells in E16 explants (Igf2 supplementation mean: 36.7 ± 2.1 ; control mean: 20.4 ± 4.46 ; $n = 8$, $p < 0.05$) (Figures 15H-15J) and in E13 explants (data not shown).

Methods

The following methods were used to perform the above described experiments.

Cortical explants

Rat embryos were removed from extra-embryonic membranes and placed in sterile Hanks Balanced Salt Solution (HBSS). The lateral wall of the developing cortex was dissected using a fine scalpel and demarcated in the rostral-caudal direction by the width of the lateral ganglionic eminence, in the dorsal direction by the in-fold of the medial cortical wall, and in the lateral direction by the border with the lateral ganglionic eminence. The dissected cortex was transferred to a polycarbonate membrane (Whatman; 13 mm, 8.0um) using a platinum wire loop. Explants were then cultured for 24 hours in conditions described in text. Artificial CSF (ACSF) was made fresh for each use. ACSF consisted of NaCl 119 mM, KCl 2.5 mM, NaHCO_3 26 mM, NaH_2PO_4 1 mM, Glucose 11 mM, MgCl_2 2 mM, CaCl_2 2.8 mM. Supplemental IGF2 (US Biologicals) was added to ACSF at a final concentration of 2 ng/ml. 15 μg of IGF2 neutralization antibody in 15 μl of PBS (Millipore) was

incubated with 100% E17 CSF for 1 hour rotating at 4°C. As a control, 15 µl of PBS was incubated with 100% E17 CSF. For BrdU labeling, explants were pulsed with BrdU for 30 minutes immediately prior to fixation. Explants were fixed (60% methanol, 30% chloroform, and 10% acetic acid) for 5-10 minutes, washed with 70% ethanol, embedded in paraffin, and sectioned at 5µm. Explant integrity was visualized by Hematoxylin and Eosin staining (data not shown).

Immunohistochemical and immunoblot analysis

The following antibodies were purchased: mouse anti-Tuj1 1:250 (Covance), rat anti-BrdU 1:400 (AbD Serotec), rabbit anti-PH3 1:400 (Upstate), mouse anti-Vimentin 4A4 1:100 (Assay Designs), guinea pig anti-GLAST 1:100 (Company name), anti-phospho-Histone H3 1:400 (Upstate), rabbit P-AKT 1:100 (Cell Signaling), rabbit P-IGF1R, 1:100 (Cell Signaling), HRP conjugated anti-albumin 1:10,000 (Immunology Consultants Laboratory, Inc.), HRP conjugated anti-transferrin 1:1000 (Immunology Consultants Laboratory, Inc.), rabbit anti-Cystatin C 1:1000 (abcam), rabbit anti-Cathepsin B 1:1000 (abcam), rabbit anti-IGF2 1:100 (Santa Cruz Biotechnology), rabbit anti-FGF2 1:100 (Santa Cruz Biotechnology), rabbit anti-EC-SOD 1:1000 (Stressgen), mouse anti-APP 1:100 (Chemicon International).

Cortical neurospheres

E14 rat cortex was dissected in sterile HBSS followed by gentle trituration. Primary spheres were generated in DMEM/F12 supplemented with heparin, N2, FGF (10 ng/ml), and EGF (20 ng/ml) and collected after 7-9 days in vitro (DIV). Primary spheres were then re-suspended in media without EGF or FGF, dissociated into single cells, plated at a final density of 2,500 cells/cm², and cultured in various media conditions. Fresh media was supplemented on day 4 of incubation. Cells were fixed in 4% Paraformaldehyde and stained for GLAST after 10 DIV.

Cortical cell cultures

Cultures of mixed cortical progenitor cells and neurons were prepared. Briefly, mouse embryonic E13.5 cortices were isolated and dissociated by
5 Papain Dissociation System according to the manufacturer's instructions
(Worthington Biochem. Corp). Cells were cultured in NBM supplemented with
1% penicillin-streptomycin, 1% glutamine, N2, and bFGF (10 ng/ml). The
following day, cells were deprived of growth factors for 6 hours, followed by a
5 minute pulse of ACSF, embryonic CSF, or Igf2 (20ng/ml).

10

In situ hybridization

Non-radioactive in situ hybridization was performed as described
(Berger et al., J Comp Neurol 433, 101-14 (2001)), using a digoxigenin (DIG)-
labelled cRNA probe generated from a TA vector (Invitrogen) clone of IGF1 or
15 IGF2 cDNA and frozen rat brain sections.

Other embodiments

All patents, patent applications, and publications mentioned in this
specification, including U.S. Provisional Application No. 60/963,211, filed
20 August 3, 2007, are hereby incorporated by reference to the same extent as if
each independent patent, patent application, or publication was specifically and
individually indicated to be incorporated by reference.

What is claimed is:

Claim

1. A composition comprising at least one component of e-CSF, wherein said component is present at an enhanced level relative to the level in e-CSF and said composition is capable of supporting proliferation, maintenance, or differentiation of a cultured cell.
2. The composition of claim 1 comprising at least two components of e-CSF.
3. The composition of claim 1 or 2, wherein said component is a polypeptide.
4. The composition of claim 3, wherein said polypeptide is 14-3-3 protein beta/alpha, 14-3-3 protein epsilon, 14-3-3 protein gamma, 14-3-3 protein theta, 14-3-3 protein zeta/delta, 15 kda protein, 170 kda protein-glutamyl-prolyl-trna synthetase, 1-phosphatidylinositol-4,5-bisphosphate phosphodiesterase gamma 1, 26s protease regulatory subunit 8, 26s proteasome non-ATPase regulatory subunit 1, 284 kda protein, 29 kda protein, 40s ribosomal protein s10, 40s ribosomal protein s11, 40s ribosomal protein s13, 40s ribosomal protein s18, 40s ribosomal protein s21, 40s ribosomal protein s25, 40s ribosomal protein s3, 40s ribosomal protein s3a, 40s ribosomal protein s4, x isoform, 40s ribosomal protein s6, 40s ribosomal protein s7, 40s ribosomal protein s8, 40s ribosomal protein sa, 60s acidic ribosomal protein p0, 60s acidic ribosomal protein p2, 60s ribosomal protein l13, 60s ribosomal protein l18, 60s ribosomal protein l24, 60s ribosomal protein l3, 60s ribosomal protein l4, 60s ribosomal protein l7, 60s ribosomal protein l7a, 60s ribosomal protein l8, 92 kda protein, 109 kda protein, aa1064-apolipoprotein b, AC2-008, actin, alpha skeletal muscle, actin, cytoplasmic 1, adams-1 precursor, adaptor protein complex AP-2 (alpha 2 subunit), adenosylhomocysteinase, afamin precursor, alpha 2 macroglobulin cardiac isoform, alpha actinin 4, alpha

isoform of regulatory subunit a (protein phosphatase 2), alpha-1-acid glycoprotein precursor, alpha-1-antiproteinase precursor, alpha-1-inhibitor 3 precursor, alpha-1-macroglobulin, alpha-2 antiplasmin, alpha-2-globin chain, alpha-2-hs-glycoprotein precursor, alpha-2-macroglobulin precursor, alpha-actinin-1, alpha-actinin-4, alpha-enolase, alpha-mannosidase 2, ambp protein precursor, angiotensin-converting enzyme (somatic isoform precursor), angiotensinogen precursor, apolipoprotein A-I precursor, apolipoprotein a-iv precursor, apolipoprotein b - fragment, apolipoprotein d precursor, apolipoprotein e precursor, apolipoprotein m precursor, arcadlin, ASCC3L1 protein, ATP-citrate synthase, BA1-667 - transferrin, beta-1,3-n-acetylglucosaminyltransferase lunatic fringe, beta-2-glycoprotein 1 precursor, beta-2-microglobulin precursor, beta-enolase, bifunctional heparan sulfate n-deacetylase/n-sulfotransferase 1 (ec 2.8.2.8)(glucosaminyl n-deacetylase/n-sulfotransferase 1) (ndst- 1), bone morphogenetic protein 1, cadherin egf lag seven-pass g-type receptor 2, cadherin-6 precursor, calcium-dependent secretion activator 1, calmodulin, calumenin precursor, cathepsin b precursor, cathepsin d precursor, cc2-27, cell growth regulator with ef hand domain 1, chaperonin containing tcp1, subunit 2, chaperonin containing tcp1, subunit 5, chaperonin subunit 6a, chloride intracellular channel 6, clathrin heavy chain, clip-associating protein 2, clusterin precursor, coatomer subunit beta',coatomer subunit beta, cofilin-1, cold shock domain-containing protein e1, collagen alpha-1(i) chain precursor, collagen alpha-1(iii) chain precursor, collagen alpha-1(v) chain precursor, collagen alpha-2(i) chain precursor, collagen type a1(xi)7-8, complement c3 precursor, complement c4 precursor, complement component 1, s subcomponent, complement component 2, complement component c6 precursor, complement inhibitory factor h, contactin-1 precursor, contactin-2 precursor, contrapsin-like protease inhibitor 1 precursor, contrapsin-like protease inhibitor 3 precursor, contrapsin-like protease inhibitor 6 precursor, corticosteroid-binding globulin precursor, c-reactive protein precursor, creatine kinase b-type, cullin-associated nedd8-dissociated protein 1,

cystatin c precursor, d-3-phosphoglycerate dehydrogenase, da1-24-complement factor b, damage-specific DNA binding protein 1, deleted in colorectal cancer, dermcidin, dihydropyrimidinase-related protein 2, DNA ligase 1, DNA polymerase alpha catalytic subunit (fragment), DNA polymerase delta catalytic subunit, DNA primase large subunit, drebrin 1, dynactin-1, dynein heavy chain, cytosolic, ectonucleotide pyrophosphatase/phosphodiesterase 2, elongation factor 1-alpha 1, elongation factor 2, epithelial-cadherin precursor, epsilon 1 globin, epsilon 2 globin, epsilon 3 globin, eukaryotic translation initiation factor 3 subunit 9, eukaryotic translation initiation factor 4a, isoform 1, eukaryotic translation initiation factor 4a2, eukaryotic translation initiation factor 5a-1, exportin-1, extracellular superoxide dismutase [cu-zn] precursor, fam3c-like protein, far upstream element-binding protein 2, farnesyl pyrophosphate synthetase, fatty acid synthase, fatty acid-binding protein, brain, fetub protein, fibrillin-2, fibrinogen beta chain precursor, fibulin-2 isoform a, follistatin-related protein 1 precursor, fructose-bisphosphate aldolase a, fructose-bisphosphate aldolase c, gamma-glutamyl hydrolase precursor, gelsolin, glucosamine, glucose phosphate isomerase, glucosidase, alpha; acid., glutamyl-prolyl-trna synthetase, glutathione peroxidase 3 precursor, glutathione s-transferase p, gm2 ganglioside activator protein, gpi-anchored ceruloplasmin, gpi-anchored membrane protein 1, grp78 binding protein, GTP-binding nuclear protein ran, testis-specific isoform, guanine nucleotide-binding protein beta subunit 2-like 1, haptoglobin precursor, hausp, heat shock 70 kda protein 1a/1b, heat shock cognate 71 kda protein, heat shock protein 86, heat shock protein hsp 90-beta, heat shock-related 70 kda protein 2, heat-shock protein 105 kda, hemoglobin alpha-1/2 subunit, hemoglobin beta-1 subunit, hemopexin precursor, heparin cofactor 2 precursor, hepatocyte growth factor activator, hephaestin precursor, heterogeneous nuclear ribonucleoprotein c, histidine-rich glycoprotein, histone H1.0, histone H1.2, histone H2A, hnrpk protein, hydroxymethylglutaryl-coa synthase, cytoplasmic, hypothetical protein aldoal1, hypothetical protein loc314432-similar to ubiquitin-protein ligase (ec 6.3.2.19)

e1, hypothetical protein rgd1305887-tubulin beta chain, hypothetical protein rgd1305890, hyrac, ig kappa chain c region, b allele, igh-1a protein, ikap, importin beta-1 subunit, inosine monophosphate dehydrogenase 2, insulin-like growth factor 1 receptor precursor, insulin-like growth factor-binding protein complex acid labile chain precursor, inter-alpha trypsin inhibitor, heavy chain 3, inter-alpha-inhibitor h4 heavy chain, iron-responsive element-binding protein 1, ischemia responsive 94 kda protein, isocitrate dehydrogenase [nadp] cytoplasmic, junction plakoglobin, kallistatin, kinesin-1 heavy chain, kinesin-like protein kif15, lactadherin precursor, lar receptor-linked tyrosine phosphatase, large proline-rich protein bat3, leucyl-trna synthetase, leukemia inhibitory factor receptor precursor, leukocyte common antigen-related phosphatase precursor, liver carboxylesterase 1 precursor, l-lactate dehydrogenase a chain, l-lactate dehydrogenase b chain, loc362795 protein, loc367586 protein-immunoglobulin gamma heavy chain, low-density lipoprotein receptor precursor, low-density lipoprotein receptor-related protein 2 precursor, lrrgt00164, lumican precursor, mama, mannose 6-phosphate/insulin-like growth factor ii receptor, mannosidase 2, alpha b1, mannosidase, alpha, class 1a, member 1, masp-3 protein, matrin-3, m-cadherin, metalloproteinase inhibitor 1 precursor, microfibrillar-associated protein 4, microtubule-associated protein 4, myosin-10, myosin-9, neogenin precursor, neogenin precursor, nestin, netrin receptor unc5c precursor, neural cell adhesion molecule 1, 140 kda isoform precursor, neural-cadherin precursor, neurocan core protein precursor, neuropilin-2 precursor, neuroserpin precursor, non-erythrocyte beta-spectrin, NONO/P54NRB homolog, nuclear autoantigenic sperm protein, nucleic acid binding factor PRM10, nucleolin, nucleoside diphosphate kinase a, nucleoside diphosphate kinase b, nucleosome assembly protein 1-like 1, o-glcnaase, peptidyl-prolyl cis-trans isomerase a, peptidylprolyl isomerase c, peroxiredoxin-1, peroxiredoxin-2, phosphatidylethanolamine-binding protein, phosphoglycerate kinase 1, phosphoglycerate mutase 2, plasminogen precursor, platelet endothelial cell

adhesion molecule precursor, poly [adp-ribose] polymerase 1, predicted c-1-tetrahydrofolate synthase, cytoplasmic, predicted nucleolin-related protein nrp, predicted similar to c-1-tetrahydrofolate synthase, cytoplasmic, predicted similar to fibrinogen, gamma polypeptide, predicted similar to heat shock protein 86, predicted similar to heat shock protein hsp 90-beta, predicted similar to nuclear autoantigenic sperm protein, predicted similar to postsynaptic density protein, predicted similar to proteasome 26s subunit, ATPase 3, predicted similar to t-kininogen 2 precursor (fragment), predicted: adaptor-related protein complex 1, gamma 1 subunit, predicted: aminopeptidase puromycin sensitive, predicted: ATPase, h⁺ transporting, lysosomal accessory protein 2, predicted: brain glycogen phosphorylase, predicted: cadherin 11, predicted: calsynenin 1, predicted: chromodomain helicase DNA binding protein 4, predicted: complement component 5, predicted: complement component 7, predicted: dystroglycan 1, predicted: eukaryotic translation elongation factor 1 gamma, predicted: glycoprotein-4-beta-galactosyltransferase 2, predicted: histone deacetylase 6, predicted: hypothetical protein xp_344107, predicted: hypothetical protein xp_579585, predicted: kinesin family member 4, predicted: laminin, gamma 1, predicted: microtubule-associated protein 1b, predicted: mini chromosome maintenance deficient 4 homolog, predicted: mini chromosome maintenance deficient 6, predicted: neural precursor cell expressed, developmentally down-regulated gene 4a, predicted: nidogen 2, predicted: nidogen, predicted: phosphoribosylglycinamide formyltransferase, predicted: procollagen, type xii, alpha 1, predicted: proteasome (prosome, macropain) subunit, beta type 5, predicted: protocadherin 12, predicted: retinol binding protein 4, plasma, predicted: similar to 116 kda u5 small nuclear ribonucleoprotein component, predicted: similar to 25 kda fk506-binding protein, predicted: similar to 26s proteasome non-ATPase regulatory subunit 11, predicted: similar to 40s ribosomal protein s16, predicted: similar to 40s ribosomal protein s19, predicted: similar to 40s ribosomal protein s3, predicted: similar to 40s ribosomal protein s9, predicted: similar to 60s ribosomal protein

112, predicted: similar to 60s ribosomal protein l26, predicted: similar to 60s ribosomal protein l29, predicted: similar to 60s ribosomal protein l38, predicted: similar to 60s ribosomal protein l7a, predicted: similar to alanyl-trna synthetase, predicted: similar to aldehyde dehydrogenase family 7, member a1, predicted: similar to alpha 1 type ii collagen, predicted: similar to alpha 2 type vi collagen isoform 2c2a precursor, predicted: similar to alpha 3 type vi collagen isoform 1 precursor, predicted: similar to alpha enolase, predicted: similar to alpha nac/1.9.2. protein, predicted: similar to amyloid beta (a4) precursor-like protein 1, predicted: similar to apolipoprotein c2, predicted: similar to arx, predicted: similar to beta-galactosidase precursor, predicted: similar to cad protein, predicted: similar to cadherin-5, predicted: similar to ccr4-not transcription complex, subunit 1 isoform a, predicted: similar to ccteta, eta subunit of the chaperonin containing tcp-1, predicted: similar to cellular apoptosis susceptibility protein, predicted: similar to cg1841-pa, isoform a, predicted: similar to chromatin-specific transcription elongation factor, 140 kda subunit, predicted: similar to chromosome condensation protein G, predicted: similar to coatomer protein complex subunit alpha, predicted: similar to collagen alpha 2(iv) chain precursor - mouse, predicted: similar to collagen alpha1 type vi-precursor, predicted: similar to colonic and hepatic tumor over-expressed protein isoform a, predicted: similar to crb2 protein, predicted: similar to cyfip1 protein, predicted: similar to dead/h box polypeptide 36 protein, predicted: similar to desmoplakin isoform ii, predicted: similar to DNA replication licensing factor mcm2, predicted: similar to DNA replication licensing factor mcm3, predicted: similar to DNA replication licensing factor mcm5, predicted: similar to eif4g1 protein, predicted: similar to elastin microfibril interfacier 1, predicted: similar to elav, predicted: similar to enhancer-trap-locus-1, predicted: similar to eno1 protein, predicted: similar to eukaryotic translation initiation factor 3, subunit 10 theta, 150/170kda, predicted: similar to eukaryotic translation initiation factor 4, gamma 1 isoform a, predicted: similar to expressed sequence ai314180, predicted: similar to

expressed sequence c79407, predicted: similar to fibulin-1 precursor, predicted: similar to filamin a, predicted: similar to filamin b, predicted: similar to fras1 related extracellular matrix protein 2, predicted: similar to gamma-filamin, predicted: similar to gcn1 general control of amino-acid synthesis 1- like 1, predicted: similar to glyceraldehyde-3-phosphate dehydrogenase, predicted: similar to gtpase activating protein and vps9 domains 1, predicted: similar to hcf, predicted: similar to heat shock 70kda protein 4 like, predicted: similar to heat shock protein hsp 90-beta, predicted: similar to hemicentin 1, predicted: similar to heparan sulfate proteoglycan 2, predicted: similar to hepatic multiple inositol polyphosphate phosphatase, predicted: similar to heterogeneous nuclear ribonucleoprotein a2/b1, predicted: similar to hspc263, predicted: similar to immunoglobulin heavy chain, predicted: similar to importin 7, predicted: similar to importin 9, predicted: similar to inter-alpha trypsin inhibitor, heavy chain 1, predicted: similar to inter-alpha-inhibitor h2 chain, predicted: similar to isoleucine-trna synthetase, predicted: similar to kinesin family member 23, predicted: similar to laminin alpha-1 chain precursor - mouse, predicted: similar to laminin b1, predicted: similar to laminin-2 alpha2 chain precursor, predicted: similar to lerk-5, predicted: similar to lipoprotein receptor-related protein, predicted: similar to mam domain containing 2, predicted: similar to methionine-trna synthetase, predicted: similar to mucin 17, predicted: similar to nischarin, predicted: similar to n-terminal acetyltransferase 1, predicted: similar to nuclear pore complex-associated intranuclear coiled-coil protein tpr, predicted: similar to ollistatin-like 5, predicted: similar to p30 dbc protein, predicted: similar to p59 immunophilin, predicted: similar to pappalysin-2 precursor, predicted: similar to peptidoglycan recognition protein 2, predicted: similar to periostin precursor (pn) (osteoblast-specific factor 2) (OSF-2), predicted: similar to phospholipid transfer protein, predicted: similar to phosphoribosylformylglycinamide synthase, predicted: similar to plexin-b2 precursor, predicted: similar to poly(rc)-binding protein 1, predicted: similar to procollagen, type ix, alpha 2, predicted: similar to programmed cell death 6

interacting protein, predicted: similar to protocadherin 1 isoform 2 precursor, predicted: similar to protocadherin 18 precursor, predicted: similar to protocadherin 19 precursor, predicted: similar to psmc6 protein, predicted: similar to ptk7 protein tyrosine kinase 7, predicted: similar to putative E3 ligase, predicted: similar to putative pre-mrna splicing factor rna helicase, predicted: similar to pyruvate kinase (ec 2.7.1.40) isozyme m2 - rat, predicted: similar to pyruvate kinase 3, predicted: similar to ran binding protein 5, predicted: similar to ranbp21, predicted: similar to ranbp4, predicted: similar to ras gtpase-activating-like protein iqgap1, predicted: similar to regulator of nonsense transcripts 1, predicted: similar to ribosomal protein L14, predicted: similar to ribosomal protein L28, predicted: similar to ribosomal protein L34, predicted: similar to ribosomal protein L6, predicted: similar to riken cDNA b430218l07 gene, predicted: similar to rna helicase a, predicted: similar to seizure 6-like protein precursor, predicted: similar to sema6a protein, predicted: similar to semaphorin 6d-4, predicted: similar to serine protease inhibitor 2.4, predicted: similar to serotransferrin precursor, predicted: similar to shprh protein, predicted: similar to sidekick 2, predicted: similar to slit-like 2, predicted: similar to slit-robo rho gtpase-activating protein 1, predicted: similar to smc2 protein, predicted: similar to sorcsb splice variant of the vps10 domain receptor sorcs, predicted: similar to splicing factor 3b, subunit 3, 130kda, predicted: similar to stabilin-1, predicted: similar to sushi, von willebrand factor type a, egf and pentraxin domain containing 1, predicted: similar to talin 2, predicted: similar to t-complex protein 1 subunit theta, predicted: similar to translin-associated factor x (tsnax) interacting protein 1, predicted: similar to tubulin-specific chaperone d, predicted: similar to ubiquitin carboxyl-terminal hydrolase 5, predicted: similar to ubiquitin specific protease 9, x-linked, predicted: similar to ubiquitin-activating enzyme e1, predicted: similar to ubiquitin-conjugating enzyme e2 l3, predicted: similar to very large g protein-coupled receptor 1, predicted: similar to vesicular integral-membrane protein vip36 precursor, predicted: similar to vinculin, predicted: splicing factor 3b,

subunit 1, predicted: thrombospondin 4, predicted: transforming growth factor, beta induced, 68 kda, predicted: tripartite motif protein 28, predicted: tumor rejection antigen gp96, predicted: tyrosine kinase receptor 1, predicted: von willebrand factor, predicted-40s ribosomal protein s17, predicted-heat shock protein hsp 90-beta (fragment), predicted-heterogeneous nuclear ribonucleoprotein a1, predicted-inhibin binding protein long isoform, predicted-matrin-3, predicted-proteasome 26s subunit, ATPase 3, probable g-protein coupled receptor 116 precursor, procollagen c-endopeptidase enhancer 1 precursor, procollagen-lysine,2-oxoglutarate 5-dioxygenase 3 precursor, procollagen-lysine,2-oxoglutarate 5-dioxygenase 3 precursor, profilin-1, proliferating cell nuclear antigen, proliferation-associated 2g4, 38kda, prominin-1s1 splice variant, proprotein convertase subtilisin/kexin type 9 precursor, proteasome (prosome, macropain) 26s subunit, non-ATPase, 2, proteasome subunit alpha type 2, proteasome subunit alpha type 6, proteasome subunit beta type 1, proteasome subunit beta type 2, protective protein for beta-galactosidase, protein arginine n-methyltransferase 1, protein disulfide-isomerase a3 precursor, protein disulfide-isomerase precursor, protein kinase c-binding protein nell2, prothrombin precursor (fragment), protocadherin gamma subfamily c, 3, protocadherin,PRX IV, pyruvate kinase, muscle, quiescin q6, rab gdp dissociation inhibitor alpha, rab gdp dissociation inhibitor beta, rat alpha(1)-inhibitor 3, variant i precursor, rat t-kininogen, ratsg1, receptor-like protein tyrosine phosphatase gamma b-type isoform, receptor-like protein tyrosine phosphatase kappa extracellular region, retinol-binding protein i, cellular, rho gdp dissociation inhibitor (gdi) alpha, ribonucleotide reductase m1, ribosomal protein l13a, ribosomal protein s27a, roundabout homolog 1 precursor, ruvb-like 1, ruvb-like 2, secretogranin-3 precursor, sema4b protein (fragment), serine (or cysteine) proteinase inhibitor, clade a (alpha-1 antiproteinase, antitrypsin), member 6, serine peptidase inhibitor, clade f, member 2, serine peptidase inhibitor, clade g, member 1, serine/cysteine proteinase inhibitor, clade c, member 1, serine/threonine-protein phosphatase

2a catalytic subunit beta isoform, serum albumin precursor, sez6b, shen-dan, similar to riken cDNA 2810409h07, smc411 protein, soluble calcium-activated nucleotidase 1, sortilin precursor, sp120-heterogeneous nuclear ribonucleoprotein u, sparc precursor, sparc-like protein 1 precursor, spectrin alpha chain, brain, splice isoform 1 of 40s ribosomal protein s24, splice isoform 1 of acetyl-coa carboxylase 1, splice isoform 1 of agrin precursor, splice isoform 1 of alpha-1b-glycoprotein precursor, splice isoform 1 of alpha-fetoprotein precursor, splice isoform 1 of attractin precursor, splice isoform 1 of cullin-associated nedd8-dissociated protein 2, splice isoform 1 of DNA-binding protein a, splice isoform 1 of fibrinogen alpha chain precursor, splice isoform 1 of fibronectin precursor, splice isoform 1 of heterogeneous nuclear ribonucleoprotein d0, splice isoform 1 of heterogeneous nuclear ribonucleoprotein m, splice isoform 1 of myosin-11 (fragment), splice isoform 1 of neurofascin precursor, splice isoform 1 of neuronal cell adhesion molecule precursor, splice isoform 1 of protein set, splice isoform 1 of reelin precursor, splice isoform 1 of sex hormone-binding globulin precursor, splice isoform 2 of DNA, splice isoform 2 of interleukin enhancer-binding factor 3, splice isoform 2 of plasminogen activator inhibitor 1 rna-binding protein, splice isoform 2 of polypyrimidine tract-binding protein 2, splice isoform 2 of receptor-type tyrosine-protein phosphatase zeta precursor, splice isoform 2 of tropomyosin beta chain, splice isoform app770 of amyloid beta a4 protein precursor (fragment), splice isoform b of ap-1 complex subunit beta-1, splice isoform cdk2-alpha of cell division protein kinase 2, splice isoform gamma-b of fibrinogen gamma chain precursor, splice isoform hmw of kininogen-1 precursor, splice isoform iiba of dynamin-2, splice isoform long of hyaluronan and proteoglycan link protein 1 precursor, splice isoform pam-1 of peptidyl-glycine alpha-amidating monooxygenase precursor, splice isoform pybp1 of polypyrimidine tract-binding protein 1, splice isoform v0 of versican core protein precursor (fragment), spliceosome rna helicase bat1, ssb protein, staphylococcal nuclease domain-containing protein 1, stathmin, structural

maintenance of chromosome 1-like 1 protein, structural maintenance of chromosome 3, superoxide dismutase, syntenin-1, t-cadherin, t-complex protein 1 subunit alpha, t-complex protein 1 subunit delta, tenascin (fragment), thrombospondin 1, tln protein, TPA: proteasome subunit beta type 6-like, transcobalamin-2 precursor, transitional endoplasmic reticulum ATPase, transketolase, translationally-controlled tumor protein, transthyretin precursor, triosephosphate isomerase, tripeptidyl-peptidase 2, tubulin alpha-1 chain, tubulin beta chain, tubulin beta-3 chain, tubulin beta-5 chain, tubulin, beta, 2, tumor necrosis factor type 1 receptor associated protein, txnrd1 protein, udp-n-acetylglucosamine--peptide n-acetylglucosaminyltransferase 110 kda subunit, uridine monophosphate synthetase, vacuolar ATP synthase subunit s1 precursor, valyl-trna synthetase, vascular cell adhesion protein 1 precursor, vesicle associated protein, vigilin, vimentin, vitamin d-binding protein precursor, vitamin k-dependent protein s precursor, zero beta-1 globin, zinc phosphodiesterase elac protein 2, or a functional fragment thereof.

5. The composition of claim 3, wherein said polypeptide is 114 kda protein, 116 kda u5 small nuclear ribonucleoprotein component, , 120 kda protein - importin 7, 127 kda protein - ran binding protein 5, 14-3-3 protein epsilon, 14-3-3 protein eta, 14-3-3 protein gamma, 14-3-3 protein theta, 14-3-3 protein zeta/delta, 150 kda oxygen-regulated protein precursor, 16 kda protein, 182 kda tankyrase 1-binding protein, 1-phosphatidylinositol-4,5-bisphosphate phosphodiesterase gamma 1, 22 kda protein, 26s protease regulatory subunit 4, 26s protease regulatory subunit 6a, 26s protease regulatory subunit 7, 26s protease regulatory subunit 8, 26s protease regulatory subunit s10b, 26s proteasome non-ATPase regulatory subunit 12, 26s proteasome non-ATPase regulatory subunit 14, 26s proteasome non-ATPase regulatory subunit 2, 26s proteasome non-ATPase regulatory subunit 3, 26s proteasome non-ATPase regulatory subunit 6, 26s proteasome non-ATPase regulatory subunit 7, 3-mercaptopyruvate sulfurtransferase, 40s ribosomal protein s10, 40s ribosomal

protein s13, 40s ribosomal protein s14, 40s ribosomal protein s15, 40s ribosomal protein s16, 40s ribosomal protein s17, 40s ribosomal protein s18, 40s ribosomal protein s19, 40s ribosomal protein s2, 40s ribosomal protein s21, 40s ribosomal protein s23, 40s ribosomal protein s25, 40s ribosomal protein s3, 40s ribosomal protein s4, x isoform, 40s ribosomal protein s7, 40s ribosomal protein s8, 40s ribosomal protein s9, 45 kda protein -homologous to phospholipid transfer protein, 47 kda heat shock protein precursor, 55 kda protein, 60 kda heat shock protein, mitochondrial precursor, 60s acidic ribosomal protein p0, 60s acidic ribosomal protein p2, 60s ribosomal protein 110a, 60s ribosomal protein 112, 60s ribosomal protein 118, 60s ribosomal protein 118a, 60s ribosomal protein 119, 60s ribosomal protein 121, 60s ribosomal protein 123a, 60s ribosomal protein 128, 60s ribosomal protein 13, 60s ribosomal protein 138, 60s ribosomal protein 14, 60s ribosomal protein 14, 60s ribosomal protein 15, 60s ribosomal protein 17a, 60s ribosomal protein 17a, 60s ribosomal protein 18, 60s ribosomal protein 18, 6-phosphogluconate dehydrogenase, decarboxylating, 6-phosphogluconolactonase, 72 kda type iv collagenase precursor, acetyl-coa acetyltransferase, cytosolic, acetyl-coa carboxylase 1, acidic leucine-rich nuclear phosphoprotein 32 family member a, aconitate hydratase, mitochondrial precursor, actin, aortic smooth muscle, actin, cytoplasmic 1, actin-like protein 2, actin-related protein 2/3 complex subunit 1a, acylamino-acid-releasing enzyme, adenosylhomocysteinase, adenylate kinase isoenzyme 1, adenylosuccinate synthetase isozyme 2, adenylyl cyclase-associated protein 1, adp-ribosylation factor 1, adp-ribosylation factor-like protein 3, adp-sugar pyrophosphatase, aflatoxin b1 aldehyde reductase member 2, agrin precursor, a-kinase anchor protein 12 isoform 2, alanyl-tRNA synthetase, alb (albumin) protein, alb protein, alcadein beta, alcohol dehydrogenase, aldehyde dehydrogenase 16 family, member a1, alpha 3 type vi collagen isoform 1 precursor, alpha isoform of regulatory subunit a, protein phosphatase 2, alpha-1-acid glycoprotein 2 precursor, alpha-1-antitrypsin precursor, alpha-1b-glycoprotein precursor, alpha-2-antiplasmin precursor,

alpha-2-hs-glycoprotein precursor, alpha-2-macroglobulin precursor, alpha-actinin-1, alpha-actinin-4, alpha-centractin, alpha-enolase, lung specific, alpha-fetoprotein precursor, alpha-internexin, alpha-mannosidase 2, alpha-soluble nsf attachment protein, ambp protein precursor, amyloid-like protein 1 precursor, angiotensinogen precursor, angiotensinogen precursor, ankyrin repeat and fyve domain containing 1 isoform 1, annexin a5, antithrombin iii variant, ap-1 complex subunit mu-1, ap-2 complex subunit alpha-2, apolipoprotein a-i precursor, apolipoprotein a-ii precursor, apolipoprotein a-iv precursor, apolipoprotein b-100 precursor, apolipoprotein e precursor, apolipoprotein m, aspartate aminotransferase, cytoplasmic, aspartyl-tRNA synthetase, astrocytic phosphoprotein pea-15, ataxin-10, ATP synthase subunit alpha, mitochondrial precursor, ATP-citrate synthase, ATP-dependent DNA helicase 2 subunit 1, ATP-dependent DNA helicase 2 subunit 2, ATP-dependent RNA helicase a, ATP-dependent RNA helicase ddx1, ATP-dependent RNA helicase ddx3x, ba395114.12, basement membrane-specific heparan sulfate proteoglycan core protein precursor (perlecan), bifunctional purine biosynthesis protein purh, biliverdin reductase a precursor, bleomycin hydrolase, bm-010, brain acid soluble protein 1, c-1-tetrahydrofolate synthase, cytoplasmic, cad protein, cadherin egf lag seven-pass g-type receptor 2 precursor, cadherin-2 precursor (neuronal cadherin), cadherin-2 precursor, cadherin-5 precursor, calcium-binding protein 39, calmodulin, calnexin precursor, calpain-1 catalytic subunit, calponin-3, calreticulin precursor, calsyntenin 1 isoform 2, carboxypeptidase n subunit 2 precursor, ccr4-not transcription complex, subunit 1 isoform a, cDNA flj33352 fis, clone brace2005087, weakly similar to pre-mRNA splicing helicase brr2, cDNA flj45525 fis, clone brtha2026311, highly similar to protein disulfide isomerase a6, cDNA flj45706 fis, clone febra2028457, highly similar to nucleolin, cell division cycle 5-like protein, cellular retinoic acid-binding protein 1, centrosomal protein 170kda isoform alpha, ceruloplasmin precursor, cgi-150 protein, chaperonin containing tcp1, subunit 3 isoform b, chaperonin containing tcp1, subunit 8, class iii alcohol dehydrogenase 5 chi subunit,

clathrin heavy chain 1, cleavage and polyadenylation specificity factor 73 kda subunit, clusterin precursor, coatamer subunit alpha, coatamer subunit beta, coatamer subunit beta', coatamer subunit gamma-2, cofilin-1, cold-inducible RNA-binding protein, collagen alpha-1(i) chain precursor, collagen alpha-1(iii) chain precursor, collagen alpha-1(v) chain precursor, collagen alpha-2(i) chain precursor, collagen alpha-2(iv) chain precursor, complement c1r subcomponent precursor, complement c1s subcomponent precursor, complement c2 precursor (fragment), complement c4-a precursor, complement c5 precursor, complement component 3 precursor, complement component c6 precursor, condensin complex subunit 1, condensin complex subunit 2, condensin complex subunit 3, contactin-2 precursor, cop9 signalosome complex subunit 5, cop9 signalosome complex subunit 6, coronin-1c, corticosteroid-binding globulin precursor, creatine kinase b-type, crk-like protein, csnk2a1 protein, ctp synthase 1, ctnn protein, cystatin b, cystatin c precursor, cysteinyl-tRNA synthetase isoform c, cytochrome b5 reductase isoform 1, cytoplasmic dynein 1 light intermediate chain 2, cytoplasmic fmr1 interacting protein 1 isoform a, cytoskeleton-associated protein 5, cytosolic aminopeptidase p, cytosolic purine 5'-nucleotidase, d-3-phosphoglycerate dehydrogenase, d-dopachrome decarboxylase, dead (asp-glu-ala-asp) box polypeptide 39, isoform 2, dead box polypeptide 42 protein, deah (asp-glu-ala-his) box polypeptide 15, debranching enzyme homolog 1, desmoglein 2, developmentally-regulated gtp-binding protein 1, dihydropyrimidinase-like 2, dihydropyrimidinase-related protein 1, dihydropyrimidinase-related protein 2, dihydropyrimidinase-related protein 4, dihydropyrimidinase-related protein 5, DNA damage-binding protein 1, DNA ligase 1, DNA mismatch repair protein msh2, DNA polymerase delta catalytic subunit, DNA replication licensing factor mcm2, DNA replication licensing factor mcm3, DNA replication licensing factor mcm4, DNA replication licensing factor mcm5, DNA replication licensing factor mcm6, DNA-(apurinic or apyrimidinic site) lyase, DNA-binding protein taxreb107, DNA-directed RNA polymerase ii 140 kda polypeptide, DNA-directed RNA polymerase ii

largest subunit, DNAj homolog subfamily a member 1, DNAj homolog subfamily c member 7, dolichyl-diphosphooligosaccharide--protein glycosyltransferase 67 kda subunit precursor, doublecortex\; lissencephaly, x-linked, dpysl3 protein, drebrin, dynactin 2, dync1h1 protein, dynein heavy chain, cytosolic, early endosome antigen 1, echinoderm microtubule-associated protein-like 4, eef1a1 protein, elav, elav-like protein 1, elongation factor 1-alpha 2, elongation factor 1-delta, elongation factor 1-gamma, elongation factor 2, endoplasmin precursor, enolp protein, enolase 1, esterase d, eukaryotic initiation factor 4a-i, eukaryotic initiation factor 5a isoform i variant a, eukaryotic translation initiation factor 2 subunit 1, eukaryotic translation initiation factor 2c 1, eukaryotic translation initiation factor 3 subunit 10, eukaryotic translation initiation factor 3 subunit 2, eukaryotic translation initiation factor 3 subunit 6, eukaryotic translation initiation factor 3 subunit 8, eukaryotic translation initiation factor 4 gamma 2, eukaryotic translation initiation factor 4 gamma, 1 isoform 2, eukaryotic translation initiation factor 4 gamma, 1 isoform 4, eukaryotic translation initiation factor 5, eukaryotic translation initiation factor 5b, exosome complex exonuclease rrp42, exportin-1, exportin-7, exportin-t, extracellular matrix protein 1 precursor, fact complex subunit spt16, fact complex subunit ssrp1, f-actin capping protein alpha-1 subunit, f-actin capping protein alpha-2 subunit, factor vii active site mutant immunoconjugate, far upstream element-binding protein 2, farnesyl diphosphate synthase, fascin, fatty acid synthase, fibrillarin, fibrinogen beta chain precursor, filamin a, alpha, fk506-binding protein 3, flap endonuclease 1, flj00385 protein (fragment), fructose-bisphosphate aldolase a, fructose-bisphosphate aldolase c, fuse-binding protein-interacting repressor isoform a, galectin-3-binding protein precursor, gamma-enolase, gamma-g globin (fragment), gars protein, gcn1-like protein 1, glucosamine-6-phosphate isomerase, glucose-6-phosphate isomerase, glucosidase 2 subunit beta precursor, glutaminyl-tRNA synthetase, glutamyl-prolyl tRNA synthetase, glutathione s-transferase p, glyceraldehyde-3-phosphate dehydrogenase,

glycogen phosphorylase, brain form, glyoxylate reductase/hydroxypyruvate reductase, gmp synthase, golgi phosphoprotein 2, gpi-anchored protein p137, gtp binding protein 1, gtp-binding nuclear protein ran, guanine nucleotide-binding protein g(i)/g(s)/g(t) subunit beta 2, heat shock 70 kda protein 1, heat shock 70 kda protein 4, heat shock 70 kda protein 4l, heat shock 70kda protein 5, heat shock protein 86 (fragment), heat shock protein hsp 90-alpha 2, hemoglobin subunit alpha, hemoglobin subunit beta, hemoglobin subunit epsilon, hemoglobin subunit gamma-1, hemoglobin subunit zeta, heparin cofactor 2 precursor, hepatoma-derived growth factor, heterogeneous nuclear ribonucleoprotein a0, heterogeneous nuclear ribonucleoprotein a1 isoform b, heterogeneous nuclear ribonucleoprotein c-like 1, heterogeneous nuclear ribonucleoprotein d-like, heterogeneous nuclear ribonucleoprotein f, heterogeneous nuclear ribonucleoprotein g, heterogeneous nuclear ribonucleoprotein h1, heterogeneous nuclear ribonucleoprotein l isoform a, heterogeneous nuclear ribonucleoprotein m isoform a, heterogeneous nuclear ribonucleoprotein r, heterogeneous nuclear ribonucleoprotein u isoform a, heterogeneous nuclear ribonucleoprotein u, high mobility group protein 1-like 10, high mobility group protein b2, high-mobility group box 1, histidine-rich glycoprotein precursor, histone acetyltransferase type b catalytic subunit, histone h1.2, histone h1x, histone h2b type 2-e, histone h4, histone-binding protein rbbp4, hiv tat specific factor 1, hnrpa2b1 protein, hsc70-interacting protein, hsp90 co-chaperone cdc37, hspc117 protein, hspc121, hydroxymethylglutaryl-coa synthase, cytoplasmic, hypothetical protein dkfzp451d234, hypothetical protein dkfzp451p021, hypothetical protein dkfzp547j2313, hypothetical protein dkfzp564e242, hypothetical protein dkfzp686i0180 (fragment), hypothetical protein dkfzp686m09245, hypothetical protein dkfzp761k0511 - heat shock 90kda protein 1, beta, hypothetical protein dkfzp761k0511, hypothetical protein dkfzp781k0743, hypothetical protein loc345651, hypothetical protein loc387104, iars protein, igkv1-5 (immunoglobulin kappa variable 1-5) protein, iglc1 protein, importin alpha-4

subunit, importin beta-1 subunit, importin-7, importin-9, inorganic pyrophosphatase, inosine-5'-monophosphate dehydrogenase 2, insulin-like growth factor 2 mRNA binding protein 1, inter-alpha-trypsin inhibitor heavy chain h1 precursor, inter-alpha-trypsin inhibitor heavy chain h2 precursor, interleukin enhancer-binding factor 2, iron-responsive element-binding protein 1, isocitrate dehydrogenase [nadp] cytoplasmic, isocitrate dehydrogenase [nadp], mitochondrial precursor, isoform 1 of 26s protease regulatory subunit 6b, isoform 1 of 26s proteasome non-ATPase regulatory subunit 1, isoform 1 of 40s ribosomal protein s24, isoform 1 of acidic leucine-rich nuclear phosphoprotein 32 family member b, isoform 1 of actin-like protein 6a, isoform 1 of alpha-1-antichymotrypsin precursor, isoform 1 of alpha-adducin, isoform 1 of apoptosis inhibitor 5, isoform 1 of ATP-dependent RNA helicase ddx19b, isoform 1 of attractin precursor, isoform 1 of beta-catenin, isoform 1 of cadherin-6 precursor, isoform 1 of chromodomain helicase-DNA-binding protein 4, isoform 1 of clathrin heavy chain 2, isoform 1 of clathrin heavy chain 2, isoform 1 of cleavage and polyadenylation specificity factor 6, isoform 1 of collagen alpha-1(ix) chain precursor, isoform 1 of complement factor b precursor (fragment), isoform 1 of complement factor b precursor (fragment), isoform 1 of complement factor h precursor, isoform 1 of contactin-1 precursor, isoform 1 of cullin-3, isoform 1 of cullin-associated nedd8-dissociated protein 1, isoform 1 of cullin-associated nedd8-dissociated protein 1, isoform 1 of cytoplasmic linker protein 2, isoform 1 of cytosolic acyl coenzyme a thioester hydrolase, isoform 1 of daz-associated protein 1, isoform 1 of dipeptidyl-peptidase 3, isoform 1 of DNA replication licensing factor mcm7, isoform 1 of DNA, isoform 1 of DNA-binding protein a, isoform 1 of DNA-dependent protein kinase catalytic subunit, isoform 1 of double-strand break repair protein mre11a, isoform 1 of dynamin-2, isoform 1 of ectonucleotide pyrophosphatase/phosphodiesterase 2, isoform 1 of elav-like protein 3, isoform 1 of eukaryotic translation initiation factor 3 subunit 9, isoform 1 of exosome complex exonuclease rrp44, isoform 1 of exportin-2, isoform 1 of exportin-5,

isoform 1 of fibrinogen alpha chain precursor, isoform 1 of fibronectin precursor, isoform 1 of filamin-b, isoform 1 of filamin-c, isoform 1 of focal adhesion kinase 1, isoform 1 of gelsolin precursor, isoform 1 of general transcription factor ii-i, isoform 1 of glucosamine--fructose-6-phosphate aminotransferase [isomerizing] 1, isoform 1 of heat shock cognate 71 kda protein, isoform 1 of heterogeneous nuclear ribonucleoprotein a3, isoform 1 of heterogeneous nuclear ribonucleoprotein d0, isoform 1 of heterogeneous nuclear ribonucleoprotein h3, isoform 1 of heterogeneous nuclear ribonucleoprotein k, isoform 1 of heterogeneous nuclear ribonucleoprotein k, isoform 1 of heterogeneous nuclear ribonucleoprotein q, isoform 1 of heterogeneous nuclear ribonucleoprotein u-like protein 1, isoform 1 of host cell factor, isoform 1 of jmjc domain-containing histone demethylation protein 2b, isoform 1 of kh domain-containing, RNA-binding, signal transduction-associated protein 1, isoform 1 of lim and sh3 domain protein 1, isoform 1 of melanoma-associated antigen d2, isoform 1 of microtubule-associated protein 2, isoform 1 of microtubule-associated protein rp/eb family member 2, isoform 1 of multiple epidermal growth factor-like domains 8, isoform 1 of neogenin precursor, isoform 1 of neuronal cell adhesion molecule precursor, isoform 1 of nuclear autoantigenic sperm protein, isoform 1 of periostin precursor, isoform 1 of phospholipid transfer protein precursor, isoform 1 of phosphoserine aminotransferase, isoform 1 of plasminogen activator inhibitor 1 RNA-binding protein, isoform 1 of plexin domain-containing protein 2 precursor, isoform 1 of polyadenylate-binding protein 1, isoform 1 of polyadenylate-binding protein 4, isoform 1 of polypyrimidine tract-binding protein 1, isoform 1 of probable ATP-dependent RNA helicase ddx17, isoform 1 of proteasome subunit alpha type 7, isoform 1 of protein 4.1, isoform 1 of protein arginine n-methyltransferase 1, isoform 1 of protein phosphatase 1 regulatory subunit 7, isoform 1 of protein set, isoform 1 of ras gtpase-activating protein 1, isoform 1 of regulator of nonsense transcripts 1, isoform 1 of reticulon-4, isoform 1 of RNA-binding protein nova-1, isoform 1 of roundabout homolog 1 precursor,

isoform 1 of slit-robo rho gtpase-activating protein 3, isoform 1 of spectrin alpha chain, brain, isoform 1 of spectrin beta chain, brain 2, isoform 1 of squamous cell carcinoma antigen recognized by t-cells 3, isoform 1 of structural maintenance of chromosome 2-like 1 protein, isoform 1 of symplekin, isoform 1 of tenascin precursor, isoform 1 of transcription elongation factor spt5, isoform 1 of ubiquitin-protein ligase bre1b, isoform 1 of uridine 5'-monophosphate synthase, isoform 1 of vinculin, isoform 2 of at-rich interactive domain-containing protein 1a, isoform 2 of cadherin-11 precursor, isoform 2 of DNA replication licensing factor mcm7, isoform 2 of far upstream element-binding protein 1, isoform 2 of guanine nucleotide-binding protein g(i), alpha-2 subunit, isoform 2 of hect, uba and wwe domain-containing protein 1, isoform 2 of inter-alpha-trypsin inhibitor heavy chain h4 precursor, isoform 2 of microtubule-actin crosslinking factor 1, isoforms 1/2/3/5, isoform 2 of microtubule-associated protein 4, isoform 2 of neural cell adhesion molecule 11-like protein precursor, isoform 2 of neutral alpha-glucosidase ab precursor, isoform 2 of nmda receptor-regulated protein 1, isoform 2 of nsfl1 cofactor p47, isoform 2 of nuclear mitotic apparatus protein 1, isoform 2 of nucleophosmin, isoform 2 of proteasome subunit alpha type 3, isoform 2 of protein enabled homolog, isoform 2 of protein kiaa1967, isoform 2 of putative gtp-binding protein ptd004, isoform 2 of serine/threonine-protein kinase dcaml1, isoform 2 of serine/threonine-protein kinase pak 1, isoform 2 of splicing factor 1, isoform 2 of structural maintenance of chromosomes 4-like 1 protein, isoform 2 of suppressor of g2 allele of skp1 homolog, isoform 2 of swi/snf-related matrix-associated actin-dependent regulator of chromatin subfamily c member 2, isoform 2 of transcription factor btf3, isoform 2 of ubiquitin carboxyl-terminal hydrolase 47, isoform 2a of desmocollin-2 precursor, isoform 2c of cytoplasmic dynein 1 intermediate chain 2, isoform 3 of anamorsin, isoform 3 of DNA repair protein rad50, isoform 3 of drebrin-like protein, isoform 3 of polypyrimidine tract-binding protein 2, isoform 3 of udp-n-acetylglucosamine--peptide n- acetylglucosaminyltransferase 110 kda

subunit, isoform 4 of afadin, isoform 4 of heterogeneous nuclear ribonucleoprotein a/b, isoform 4 of saps domain family member 3, isoform 4 of tubulin-specific chaperone d, isoform 5 of dynamin-1-like protein, isoform 5 of interleukin enhancer-binding factor 3, isoform a22 of neuropilin-2 precursor, isoform app770 of amyloid beta a4 protein precursor (fragment), isoform b of arsenite-resistance protein 2, isoform b of fibulin-1 precursor, isoform b of mannose-6-phosphate receptor-binding protein 1, isoform b of neuronal-specific septin-3, isoform b1 of heterogeneous nuclear ribonucleoproteins a2/b1, isoform beta of heat-shock protein 105 kda, isoform beta-2 of DNA topoisomerase 2-beta, isoform c of fibulin-1 precursor, isoform c of neural cell adhesion molecule 1, 120 kda isoform precursor, isoform c1 of heterogeneous nuclear ribonucleoproteins c1/c2, isoform delta-1 of serine/threonine-protein phosphatase 2a 56 kda regulatory subunit delta isoform, isoform dpi of desmoplakin, isoform dut-m of deoxyuridine 5'-triphosphate nucleotidohydrolase, mitochondrial precursor, isoform ews-b of RNA-binding protein ews, isoform gamma-1 of serine/threonine-protein phosphatase pp1-gamma catalytic subunit, isoform gamma-b of fibrinogen gamma chain precursor, isoform gtbp-alt of DNA mismatch repair protein msh6, isoform gtbp-n of DNA mismatch repair protein msh6, isoform hmw of kininogen-1 precursor, isoform ii of ubiquitin-protein ligase e3a, isoform long of 60 kda ss-a/ro ribonucleoprotein, isoform long of cold shock domain-containing protein e1, isoform long of collagen alpha-1(xii) chain precursor, isoform long of spectrin beta chain, brain 1, isoform long of splicing factor, proline- and glutamine-rich, isoform long of trifunctional purine biosynthetic protein adenosine-3, isoform long of ubiquitin carboxyl-terminal hydrolase 5, isoform m1 of pyruvate kinase isozymes m1/m2, isoform p150 of dynactin-1, isoform short of heterogeneous nuclear ribonucleoprotein u, isoform short of proteasome subunit alpha type 1, isoform short of receptor-type tyrosine-protein phosphatase zeta precursor, isoform short of RNA-binding protein fus, isoform short of tata-binding protein-associated factor 2n, isoform v0 of versican core

protein precursor, isopentenyl-diphosphate delta isomerase, kh-type splicing regulatory protein, kinesin heavy chain, kinesin heavy chain isoform 5c, kinesin light chain 1 isoform 2, lactate dehydrogenase a, lamina-associated polypeptide 2 isoform alpha, laminin alpha 2 subunit precursor, laminin beta-1 chain precursor, laminin gamma-1 chain precursor (laminin b2 chain), lethal giant larvae homolog 1, leucine zipper transcription factor-like 1, leucine-rich repeat-containing protein 15 precursor, leucine-rich repeat-containing protein 47, leucyl-tRNA synthetase, cytoplasmic, liver phosphofructokinase isoform a, l-lactate dehydrogenase b chain, lumican precursor, lung cancer oncogene 7, lupus la protein, lysyl-tRNA synthetase, malate dehydrogenase, cytoplasmic, malate dehydrogenase, mitochondrial precursor, marcks-related protein, matrin-3, meprin a subunit alpha precursor, metastasis-associated protein mta2, methionine adenosyltransferase ii, beta isoform 1, methionyl-tRNA synthetase, mgea5 protein, microsomal triglyceride transfer protein large subunit precursor, microtubule-associated protein 1b, microtubule-associated protein rp/eb family member 1, mitogen-activated protein kinase 1, moesin, multifunctional protein ade2, myosin-10, myosin-11, myosin-9, myristoylated alanine-rich c-kinase substrate, nascent polypeptide-associated complex subunit alpha, ncl (nucleolin) protein, ncl protein, nestin, netrin receptor dcc precursor, neurocan core protein precursor, neuronal protein np25, ng,ng-dimethylarginine dimethylaminohydrolase 2, nidogen-2 precursor, non-pou domain-containing octamer-binding protein, nuclear cap-binding protein subunit 1, nuclear migration protein nudc, nuclease sensitive element-binding protein 1, nucleoside diphosphate kinase a, nucleoside diphosphate kinase b, nucleosome assembly protein 1-like 1, nucleosome assembly protein 1-like 4, pdcd6ip protein, pentraxin-related protein ptx3 precursor, peptidyl-prolyl cis-trans isomerase a, peptidylprolyl isomerase b precursor, peripherin, peroxiredoxin-1, peroxiredoxin-2, peroxiredoxin-6, peroxisomal multifunctional enzyme type 2, phenylalanyl-tRNA synthetase beta chain, phosphatidylethanolamine-binding protein 1, phosphatidylinositol transfer protein, beta, phosphofructokinase,

muscle, phosphoglucomutase-2-like 1, phosphoglycerate kinase 1, phosphoglycerate mutase 2, phospholipase a-2-activating protein, phosphoribosyl pyrophosphate synthetase-associated protein 2, phosphoribosylformylglycinamide synthase, phytanoyl-coa hydroxylase interacting protein-like, pigment epithelium-derived factor precursor (pedf), pigment epithelium-derived factor precursor, plasma protease c1 inhibitor precursor, plasma retinol-binding protein precursor, plasminogen precursor, platelet-activating factor acetylhydrolase, isoform ib, alpha subunit, pnas-125, poly [adp-ribose] polymerase 1, poly(rc)-binding protein 1, poly(rc)-binding protein 2 isoform b, pp856, predicted: similar to ATP-dependent DNA helicase ii, 70 kda subunit (lupus ku autoantigen protein p70) (ku70) (70 kda subunit of ku antigen) (thyroid-lupus autoantigen) (tlaa) (ctc box binding factor 75 kda subunit) (ctcbf) (ctc75) isoform 1, predicted: similar to basic leucine zipper and w2 domains 1, predicted: similar to chloride intracellular channel protein 4, predicted: similar to heterogeneous nuclear ribonucleoprotein a1, predicted: similar to heterogeneous nuclear ribonucleoprotein a3 isoform 1, predicted: similar to heterogeneous nuclear ribonucleoprotein k isoform a isoform 2, predicted: similar to heterogeneous nuclear ribonucleoprotein u, predicted: similar to peptidylprolyl isomerase a isoform 1, predicted: similar to phosphoglycerate mutase 1 (phosphoglycerate mutase isozyme b) (pgam-b) (bpg-dependent pgam 1) isoform 1, predicted: similar to ran-specific gtpase-activating protein, predicted: similar to ribosomal protein l13 isoform 1, predicted: similar to ribosomal protein s3a isoform 1, predicted: structural maintenance of chromosomes flexible hinge domain containing 1, pregnancy zone protein precursor, pre-mRNA-processing factor 6 homolog, pre-mRNA-processing-splicing factor 8, pre-mRNA-splicing factor 19, pro2275 - serpin peptidase inhibitor, clade a (alpha-1 antiproteinase, antitrypsin), member 1, pro2275, probable ATP-dependent RNA helicase ddx23, probable ATP-dependent RNA helicase ddx46, probable ATP-dependent RNA helicase ddx48, probable ATP-dependent RNA helicase ddx5, profilin 2 isoform a,

profilin-1, proliferating cell nuclear antigen, proliferation-associated protein 2g4, prolyl endopeptidase, proteasome 26s non-ATPase subunit 11 variant (fragment), proteasome 26s non-ATPase subunit 13 isoform 2, proteasome activator complex subunit 1, proteasome subunit alpha type 2, proteasome subunit alpha type 6, proteasome subunit beta type 1, proteasome subunit beta type 4 precursor, protein c14orf166, protein disulfide-isomerase a3 precursor, protein disulfide-isomerase a4 precursor, protein disulfide-isomerase precursor, protein dj-1, protein fam49b, protein fam98b, protein kinase c-binding protein nell2 precursor, protein phosphatase 2c isoform gamma, protein rcc2, protein transport protein sec23a, protein transport protein sec24c, protein tyrosine phosphatase, receptor-type, zeta1 precursor, prothrombin precursor (fragment), prothymosin alpha, puromycin-sensitive aminopeptidase, quiescin q6 isoform a, quinone oxidoreductase, rab gdp dissociation inhibitor alpha, rab gdp dissociation inhibitor beta, rab1a, member ras oncogene family, radixin, ran binding protein 5, ras gtpase-activating-like protein iqgap1, ras-gtpase-activating protein-binding protein 1, ras-related protein rab-14, ras-related protein rab-2a, ras-related protein rab-5c, ras-related protein rab-7, rcc1 protein, rctpi1 (fragment), receptor-type tyrosine-protein phosphatase f precursor, replication protein a 70 kda DNA-binding subunit, reticulocalbin-1 precursor, retinoblastoma-associated factor 600, rho gdp-dissociation inhibitor 1, ribonucleoside-diphosphate reductase large subunit, RNA binding motif protein, x-linked-like 1, RNA binding protein (fragment), RNA-binding protein 12, RNA-binding protein musashi homolog 1, ruvb-like 1, ruvb-like 2, s-adenosylmethionine synthetase isoform type-2, scc-112 protein, sec3111 protein, selenide, water dikinase 1, septin 9, septin-11, septin-2, septin-7, serine/threonine-protein kinase mrck beta, serine/threonine-protein phosphatase 2a catalytic subunit alpha isoform, serine/threonine-protein phosphatase 4 catalytic subunit, serine-threonine kinase receptor-associated protein, serotransferrin precursor, seryl-tRNA synthetase, sf3b3 protein, signal recognition particle 14 kda protein, similar to annexin a2 isoform 1, similar to

nestin, small glutamine-rich tetratricopeptide repeat-containing protein a, small nuclear ribonucleoprotein sm d1, small nuclear ribonucleoprotein sm d2, smarca4 isoform 2, sorting nexin 1 isoform c, spermatid perinuclear RNA-binding protein, spermidine synthase, spliceosome RNA helicase bat1, splicing factor 3 subunit 1, splicing factor 3a subunit 3, splicing factor 3b subunit 1, splicing factor 3b subunit 2, splicing factor 3b subunit 3, splicing factor u2af 65 kda subunit, splicing factor, arginine/serine-rich 1, splicing factor, arginine/serine-rich 2, splicing factor, arginine/serine-rich 4, staphylococcal nuclease domain-containing protein 1, stathmin, stress-70 protein, mitochondrial precursor, stress-induced-phosphoprotein 1, structural maintenance of chromosome 1-like 1 protein, structural maintenance of chromosome 3, superkiller viralicidic activity 2-like 2, swi/snf-related matrix-associated actin-dependent regulator of chromatin subfamily a member 5, synaptic vesicle membrane protein vat-1 homolog, taldo1 protein, talin-1, tar DNA-binding protein 43, t-complex protein 1 subunit alpha, t-complex protein 1 subunit beta, t-complex protein 1 subunit delta, t-complex protein 1 subunit epsilon, t-complex protein 1 subunit eta, t-complex protein 1 subunit zeta, thimet oligopeptidase, thioredoxin reductase 1, cytoplasmic precursor, thioredoxin, thioredoxin-like protein 1, thioredoxin-like protein 2, tho complex subunit 4, threonyl-tRNA synthetase, cytoplasmic, thymidylate synthase, thymopoietin isoform beta, transitional endoplasmic reticulum ATPase, transketolase, transmembrane protein 132a isoform b, transportin 1, transthyretin precursor, tripartite motif-containing 28 protein, tripartite motif-containing protein 2, tripeptidyl-peptidase 2, tropomyosin 1 alpha chain isoform 2, tropomyosin 4, TRYPSIN PRECURSOR (EC 3.4.21.4)>PIR1:TRPGTR trypsin (EC 3.4.21.4), trypsin precursor (ec 3.4.21.4)>pir1:trpgtr trypsin (ec 3.4.21.4), tryptophanyl-tRNA synthetase, tuba6 protein, tubulin alpha-1 chain, tubulin beta-1 chain, tubulin beta-2 chain, tubulin beta-2c chain, tubulin beta-3 chain, tubulin beta-4 chain, tubulin, beta 2, tubulin-specific chaperone a, tubulin-specific chaperone b, tubulin--tyrosine ligase-like protein 12, tumor

protein, translationally-controlled 1, twinfilin isoform 1, type 1 tumor necrosis factor receptor shedding aminopeptidase regulator isoform a, tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, beta polypeptide, tyrosyl-tRNA synthetase, cytoplasmic, u1 small nuclear ribonucleoprotein a, u4/u6.u5 tri-snmp-associated protein 1, u5 small nuclear ribonucleoprotein 200 kda helicase, ubiquitin and ribosomal protein s27a precursor, ubiquitin carboxyl-terminal hydrolase 10, ubiquitin carboxyl-terminal hydrolase 7, ubiquitin carboxyl-terminal hydrolase isozyme 11, ubiquitin specific protease 9, x-linked isoform 4, ubiquitin-activating enzyme e1, ubiquitin-conjugating enzyme e2 n, ubiquitin-like 1-activating enzyme e1a, ubiquitin-like 1-activating enzyme e1b, udp-glucose 6-dehydrogenase, udp-glucose ceramide glucosyltransferase-like 1 isoform 1, uncharacterized protein c20orf77, uroporphyrinogen decarboxylase, uv excision repair protein rad23 homolog b, vacuolar ATP synthase catalytic subunit a, ubiquitous isoform, vacuolar protein sorting 26a, vacuolar protein sorting 35, valyl-tRNA synthetase, vasorin precursor, vesicle-fusing ATPase, villin 2, vimentin, vitronectin precursor, von hippel-lindau binding protein 1, von willebrand factor precursor, wd repeat protein 61, wd40 protein, wugsc:h_rg054d04.1 protein, ww domain-binding protein 11, or zyxin, or a functional fragment thereof.

6. The composition of claim 3 or 4, wherein said polypeptide is produced recombinantly.

7. The composition of any of claims 1-6, wherein said component is purified.

8. The composition of any of claims 1-7, wherein said component is present at a level sufficient to enhance cell proliferation, maintenance, or differentiation.

9. The composition of any of claims 1-8, wherein said cultured cell is a stem cell or progenitor cell.

10. The composition of any of claims 1-9, wherein said cultured cell is neural cell.

11. The composition of any of claims 1-10, wherein said component is not found in adult CSF.

12. The composition of any of claims 1-11, wherein said e-CSF is rat or human.

13. A cell culture composition comprising a cell and a composition of any of claims 1-11.

14. A kit comprising:

(a) a composition comprising at least one component of e-CSF, wherein the component is present at an enhanced level relative to naturally occurring e-CSF; and

(b) instructions for using (a) for cell culture.

15. A method of culturing a stem cell or a progenitor cell, comprising incubating said cell in culture media containing at least one isolated component of rat or human e-CSF.

16. The method of claim 15, wherein said component is a polypeptide.

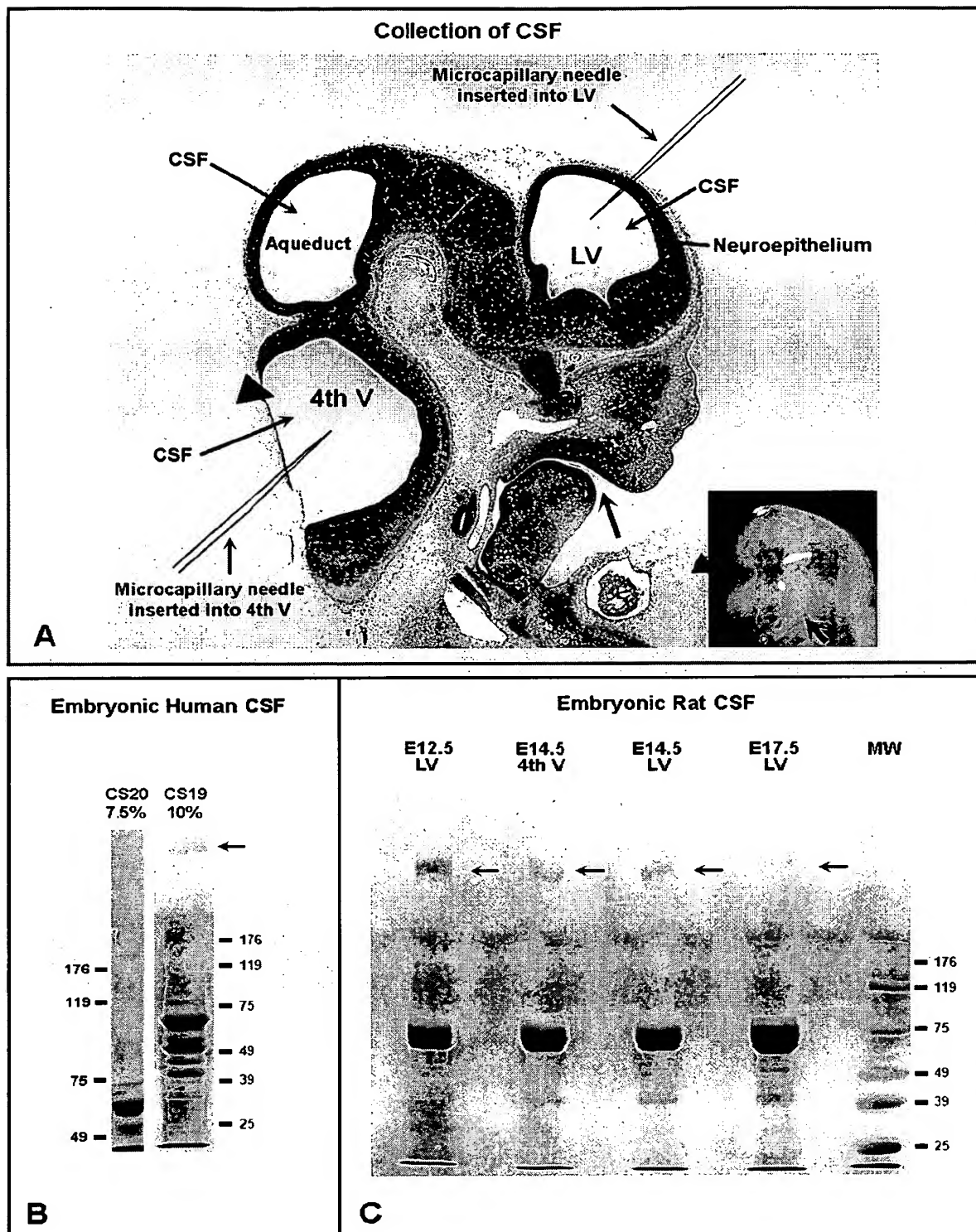
17. The method of claim 16, wherein said polypeptide is listed in Tables 1-4, or in claims 4 or 5, or a functional fragment thereof.

18. The method of claim 16 or 17, wherein said polypeptide is produced recombinantly.
19. The method of any of claims 15-18, wherein said component is purified.
20. The method of any of claims 15-19, wherein said cell is a neural stem cell or a neural progenitor cell.
21. The method of any of claims 15-20, wherein said component is not found in adult CSF.
22. A method of isolating embryonic cerebrospinal fluid (e-CSF) comprising:
- (a) providing an embryo;
 - (b) inserting a capillary needle into a ventricle of the central nervous system of said embryo such that the tip of said needle contacts CSF; and
 - (c) extracting CSF from said embryo through said needle, thereby isolating e-CSF.
23. The method of claim 22, further comprising:
- (d) removing intact contaminating cells.
24. The method of claim 2, wherein step (d) removing is performed by centrifugation or filtration.
25. The method of any of claims 22-24, wherein said step (c) is performed such that said needle tip does not contact the neuroepithelium during said extraction.

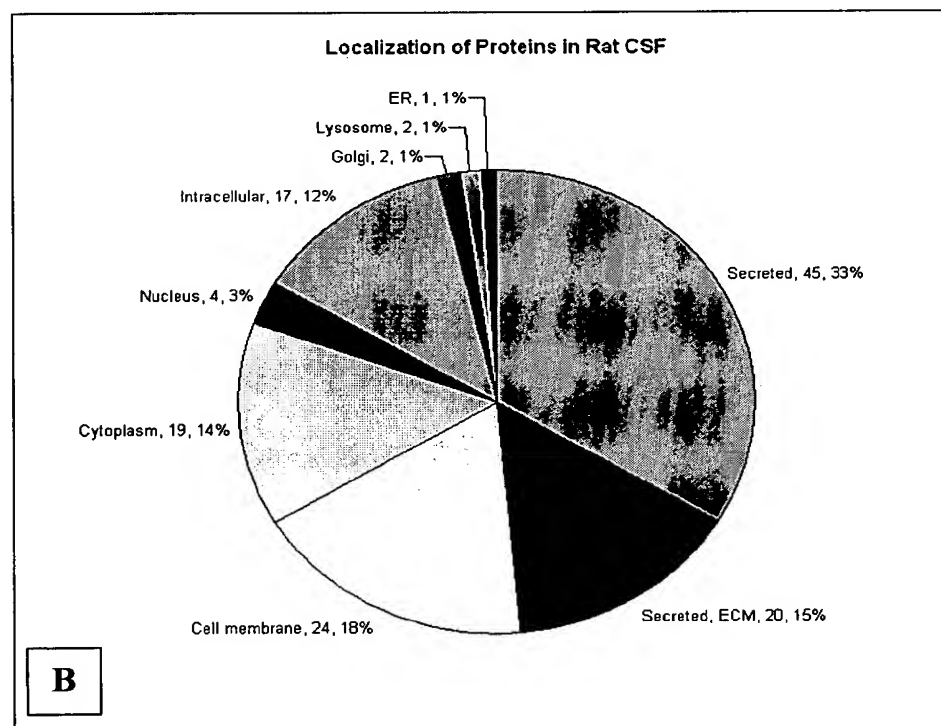
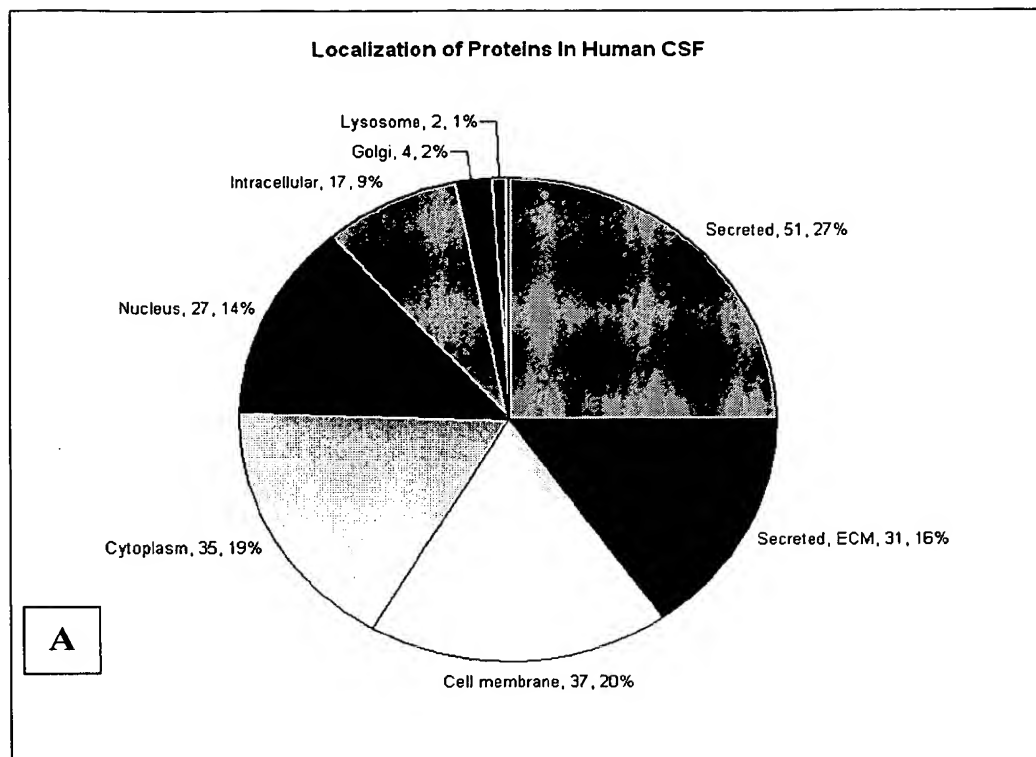
26. The method of any of claims 22-25, wherein said e-CSF is removed from a lateral ventricle or from the third or fourth ventricle of said embryo, or a combination thereof.

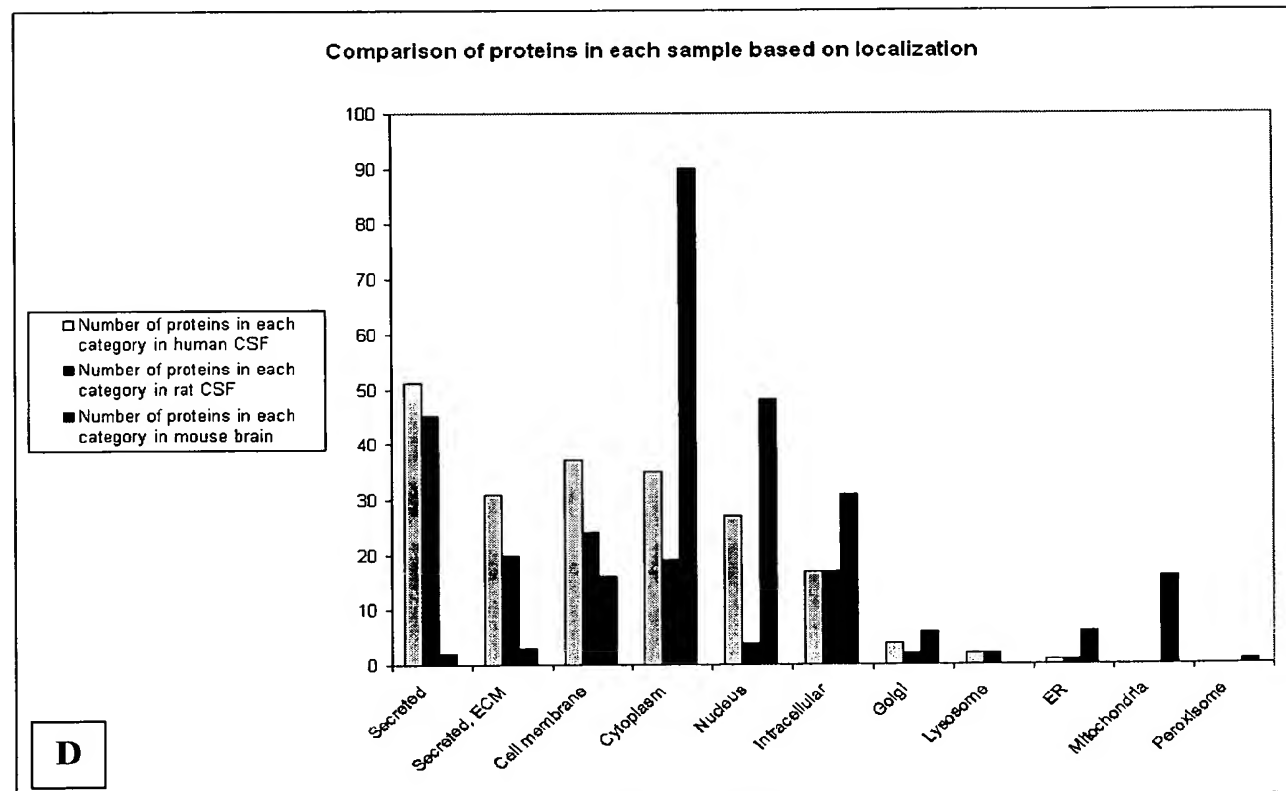
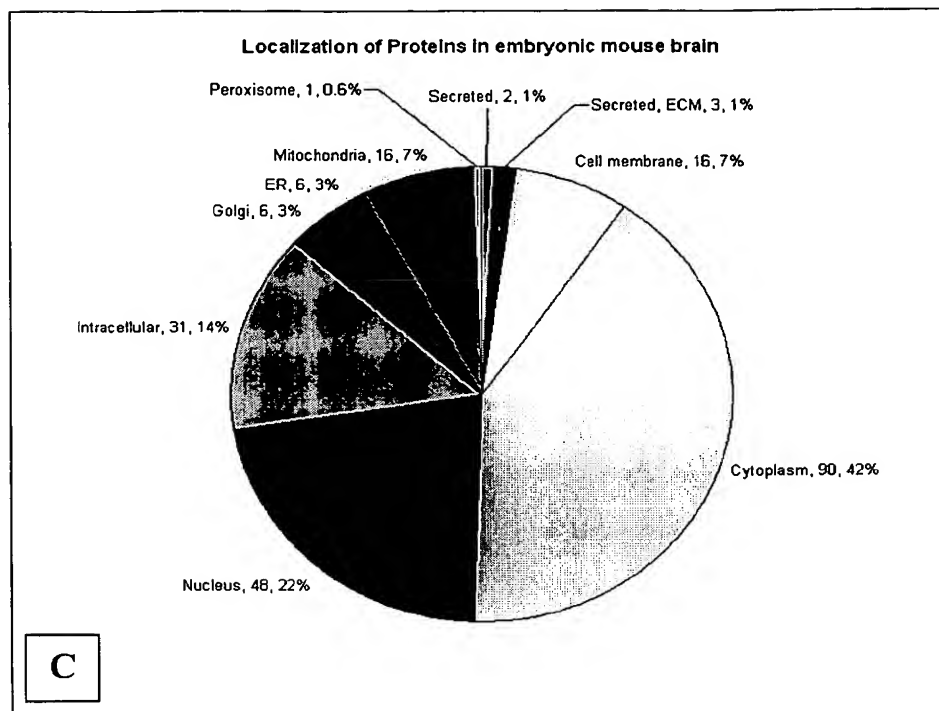
27. The method of claim 26, wherein e-CSF is removed from said lateral ventricle.

28. The method of any of claims 22-27, further comprising storing the e-CSF at less than about -20 °C to about -80 °C.

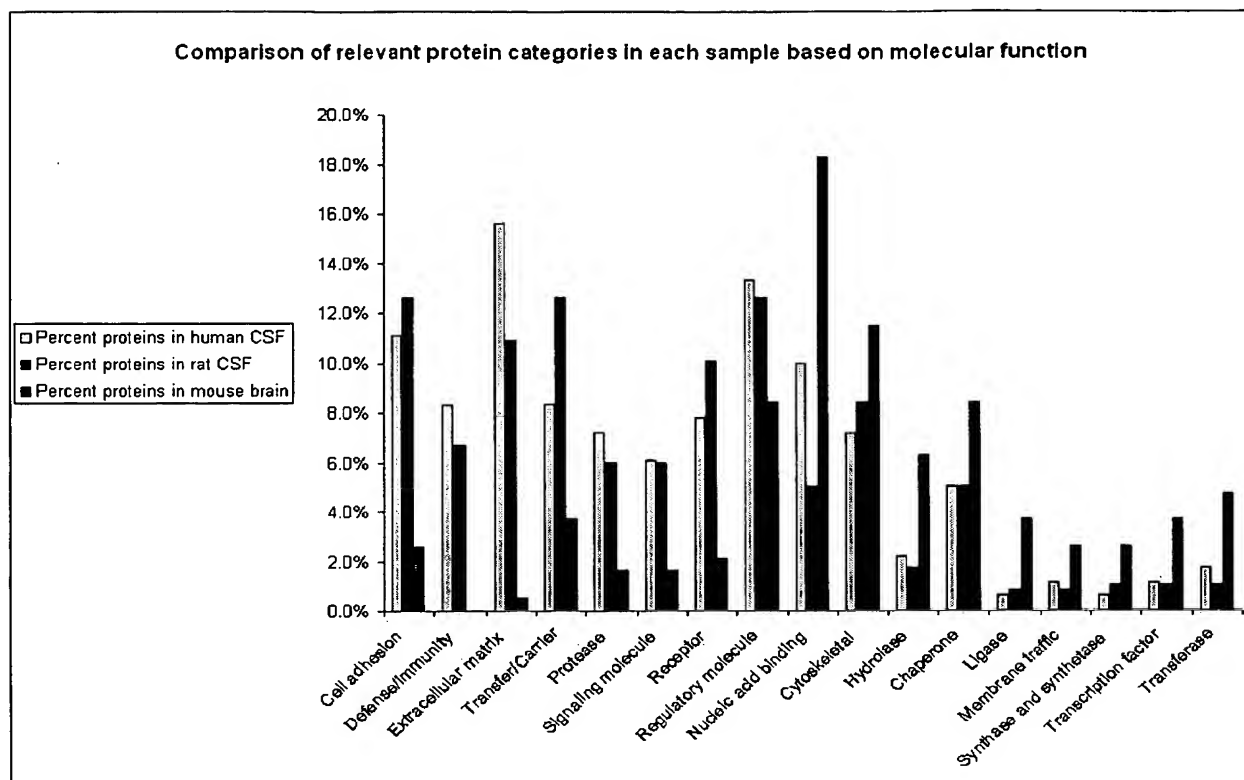


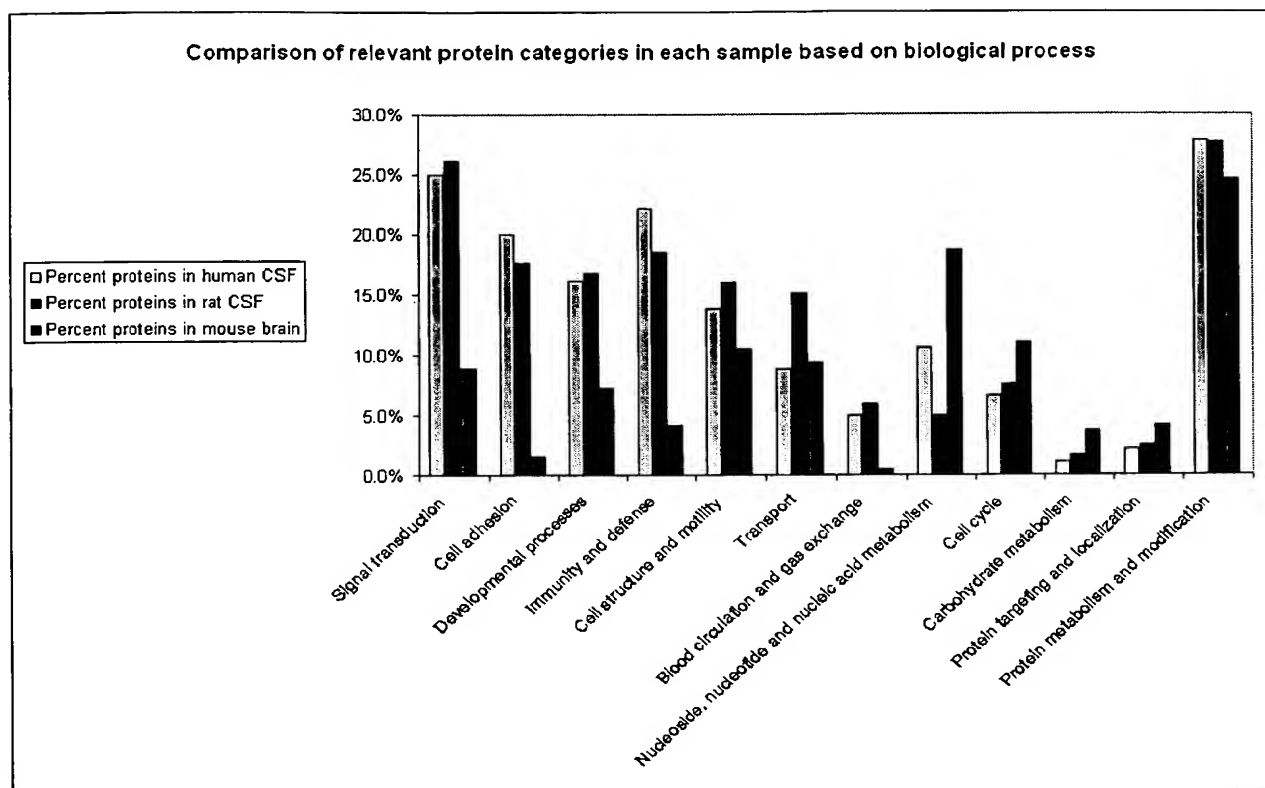
Figures 1A-1C

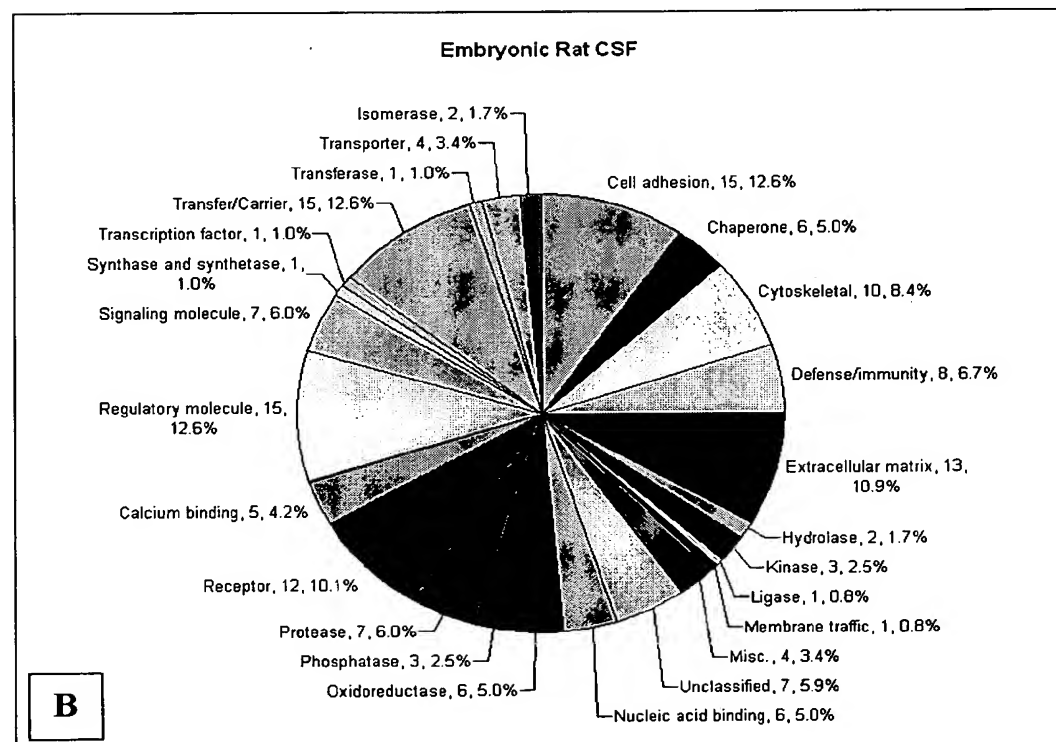
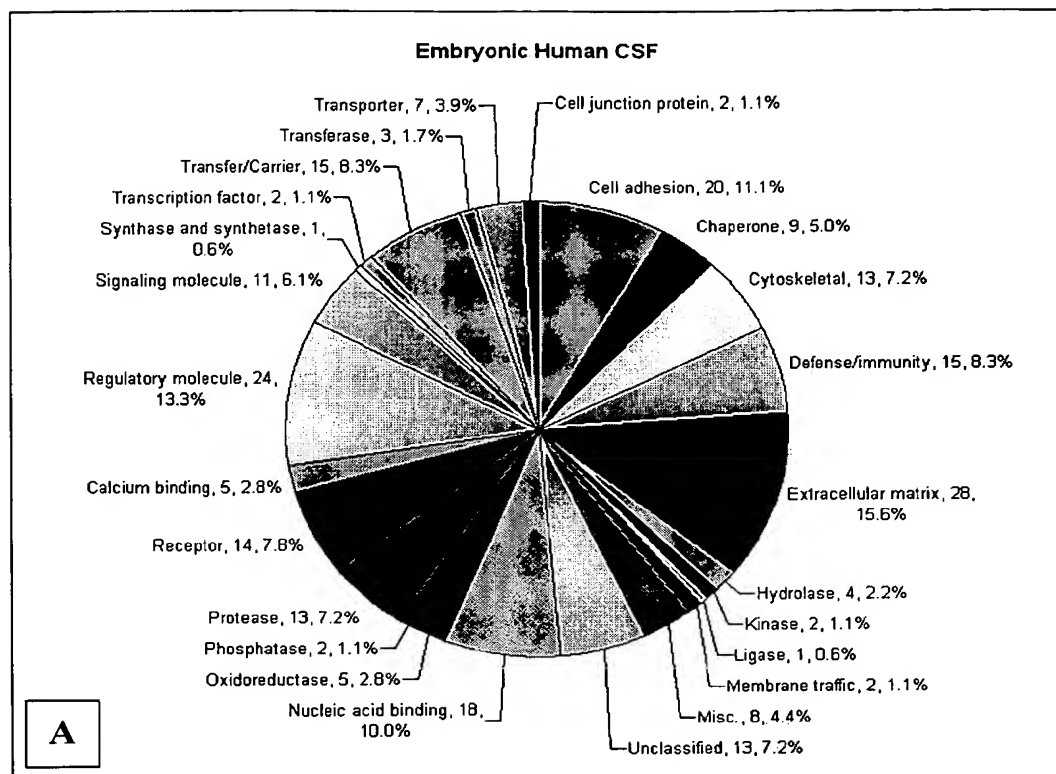
**Figures 2A and 2B**



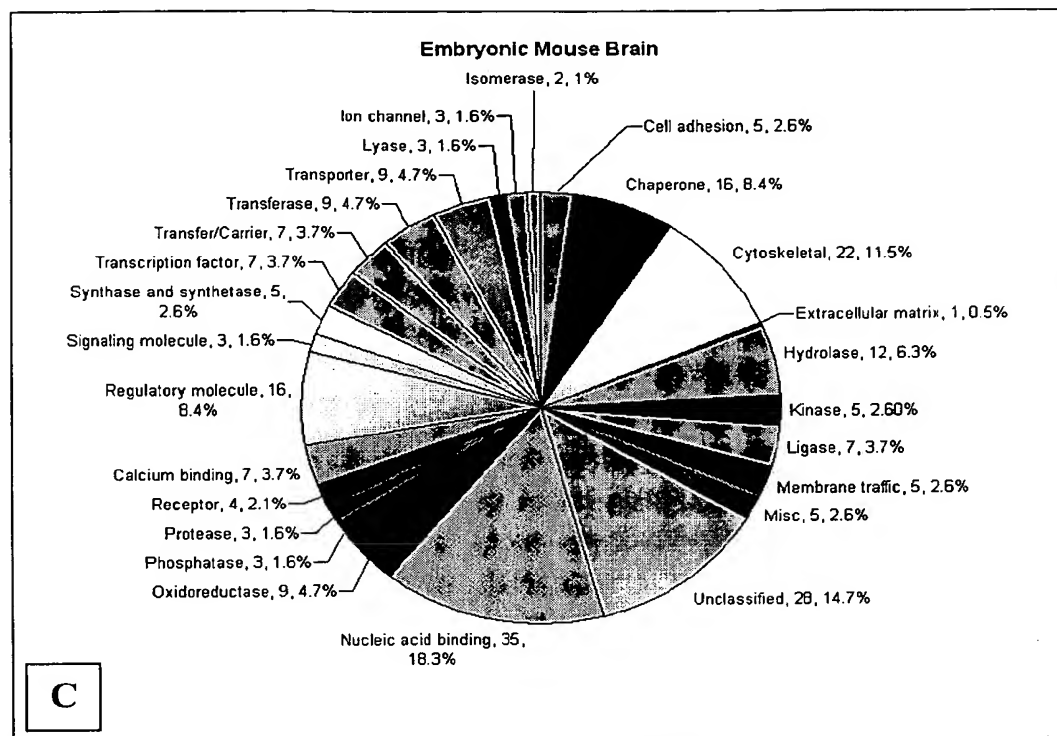
Figures 2C and 2D

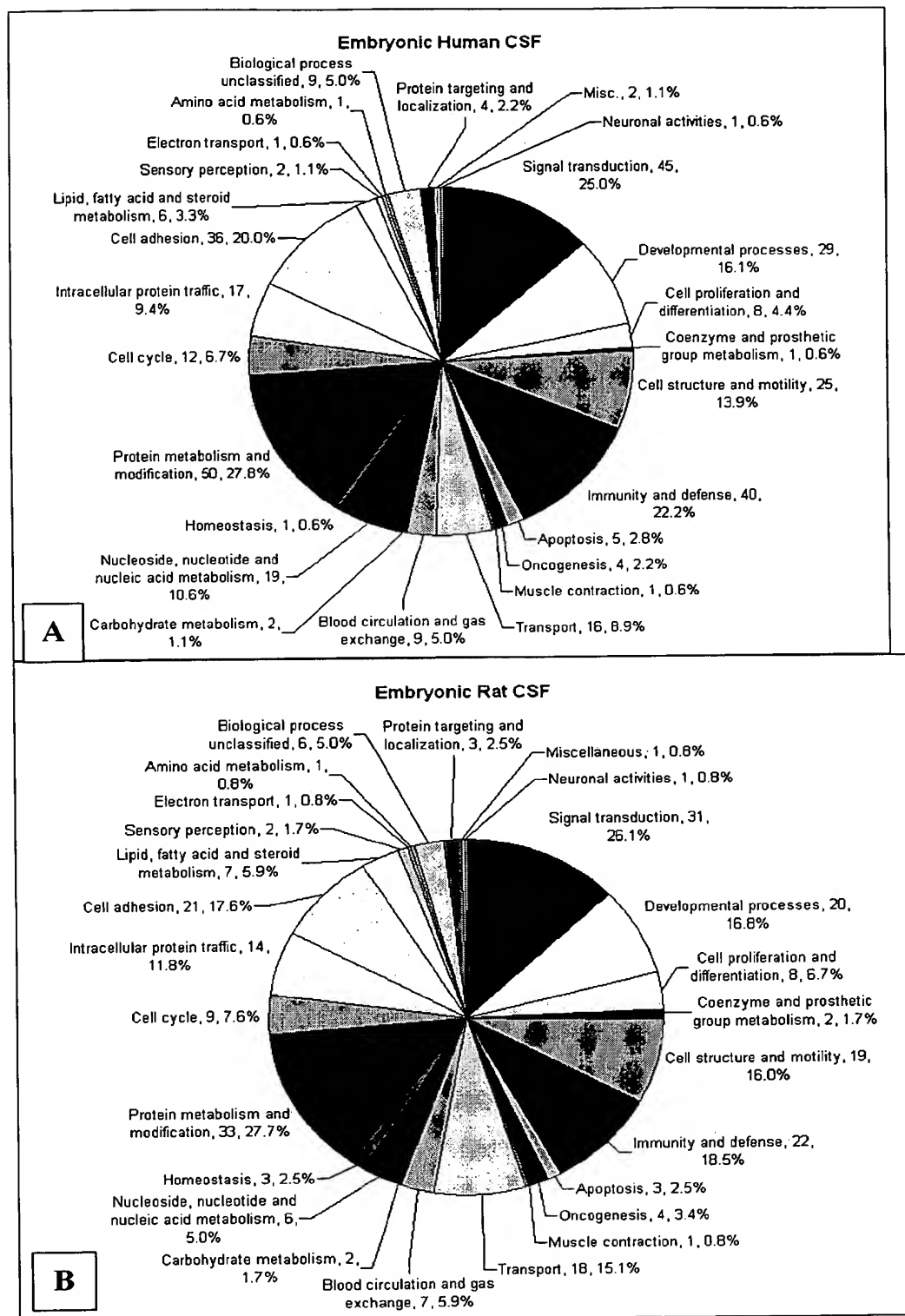
**Figure 3**

**Figure 4**



Figures 5A and 5B

**Figure 5C**



Figures 6A and 6B

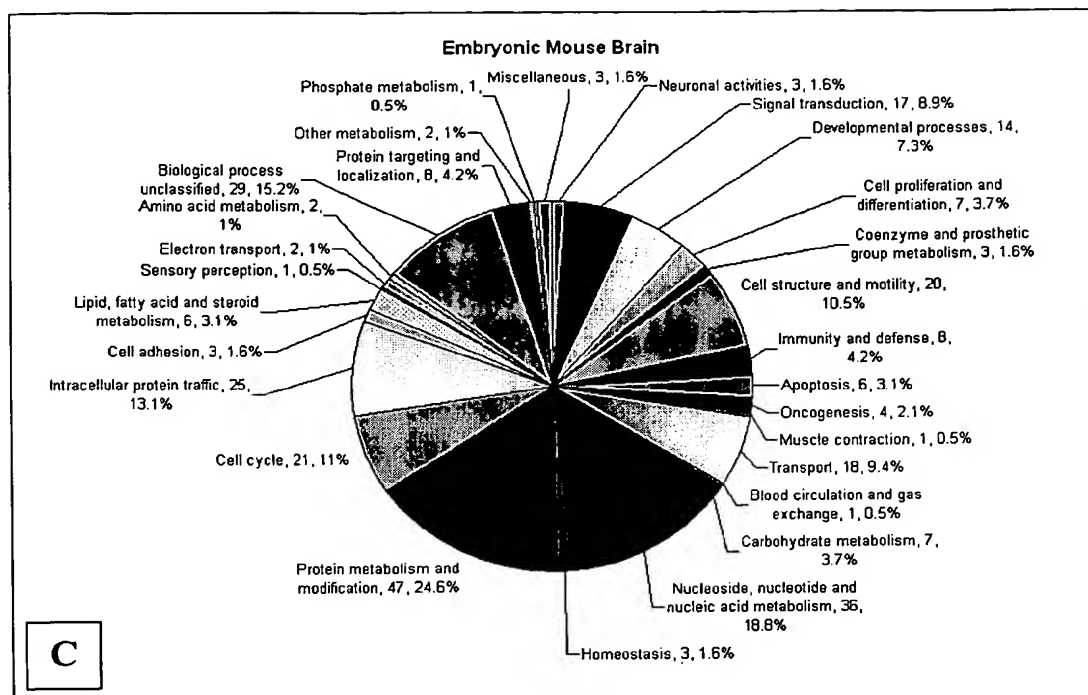
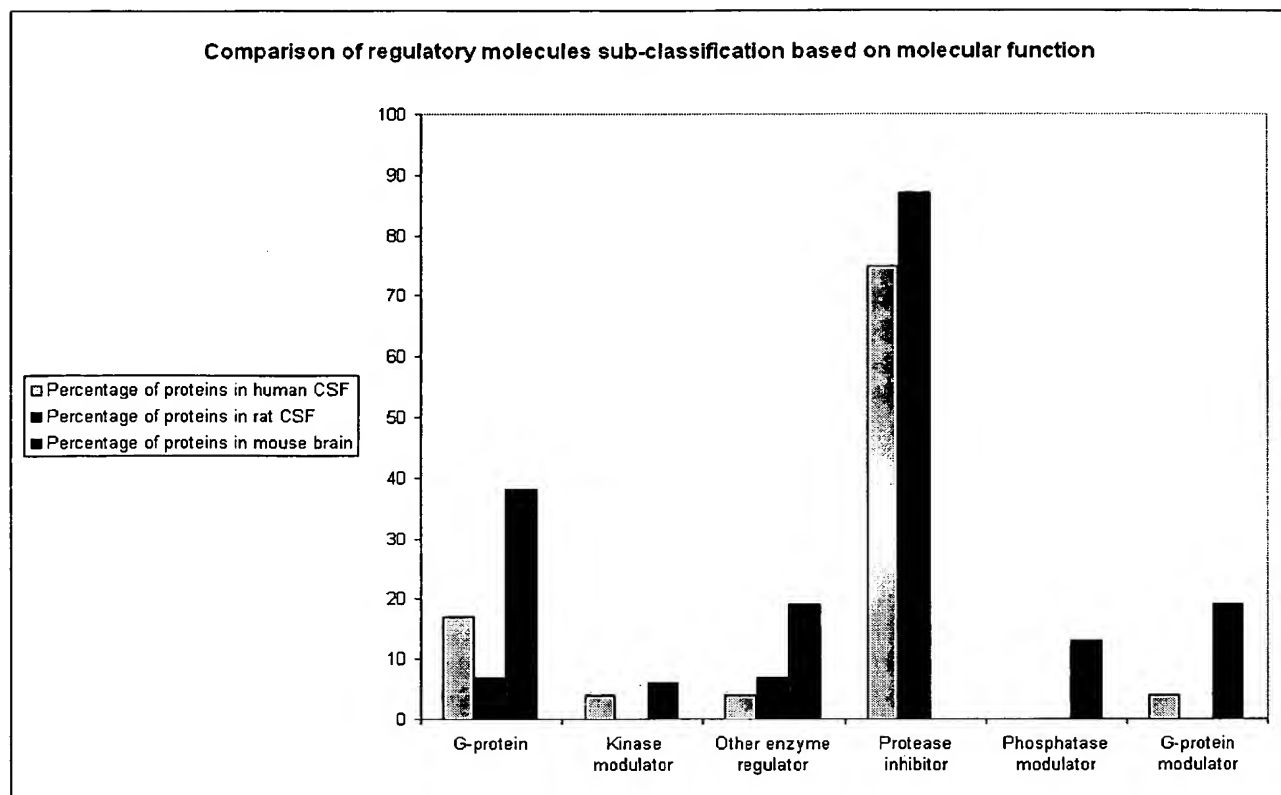
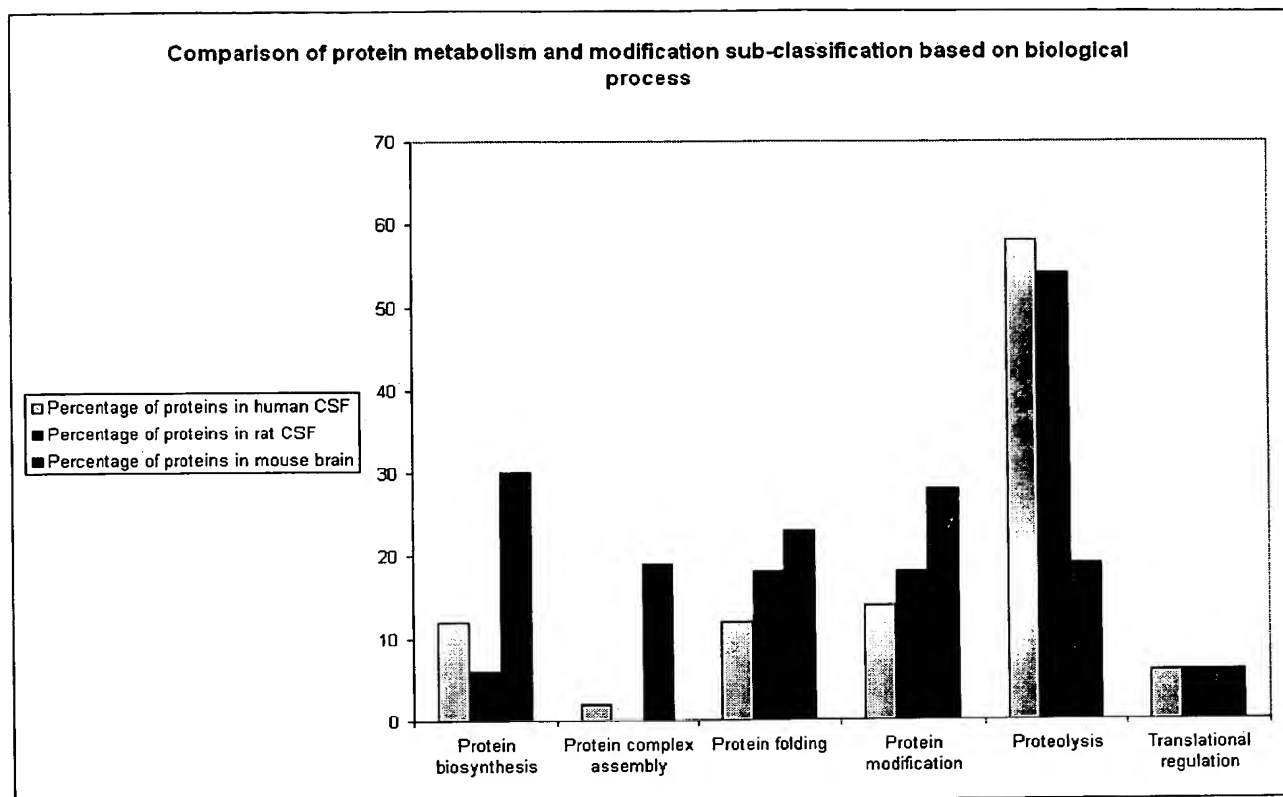
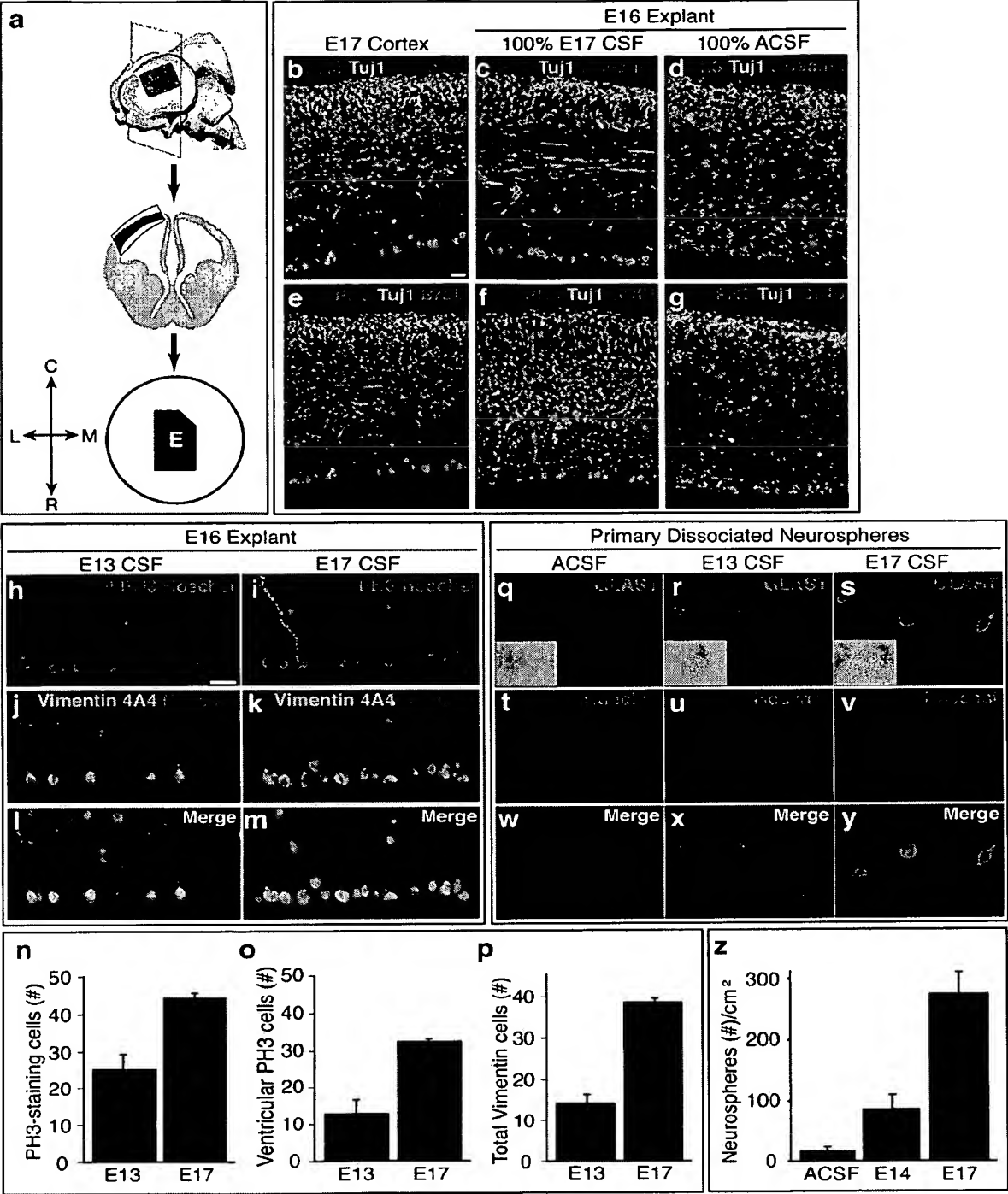


Figure 6C

**Figure 7**

**Figure 8**



Figures 9A-9Z

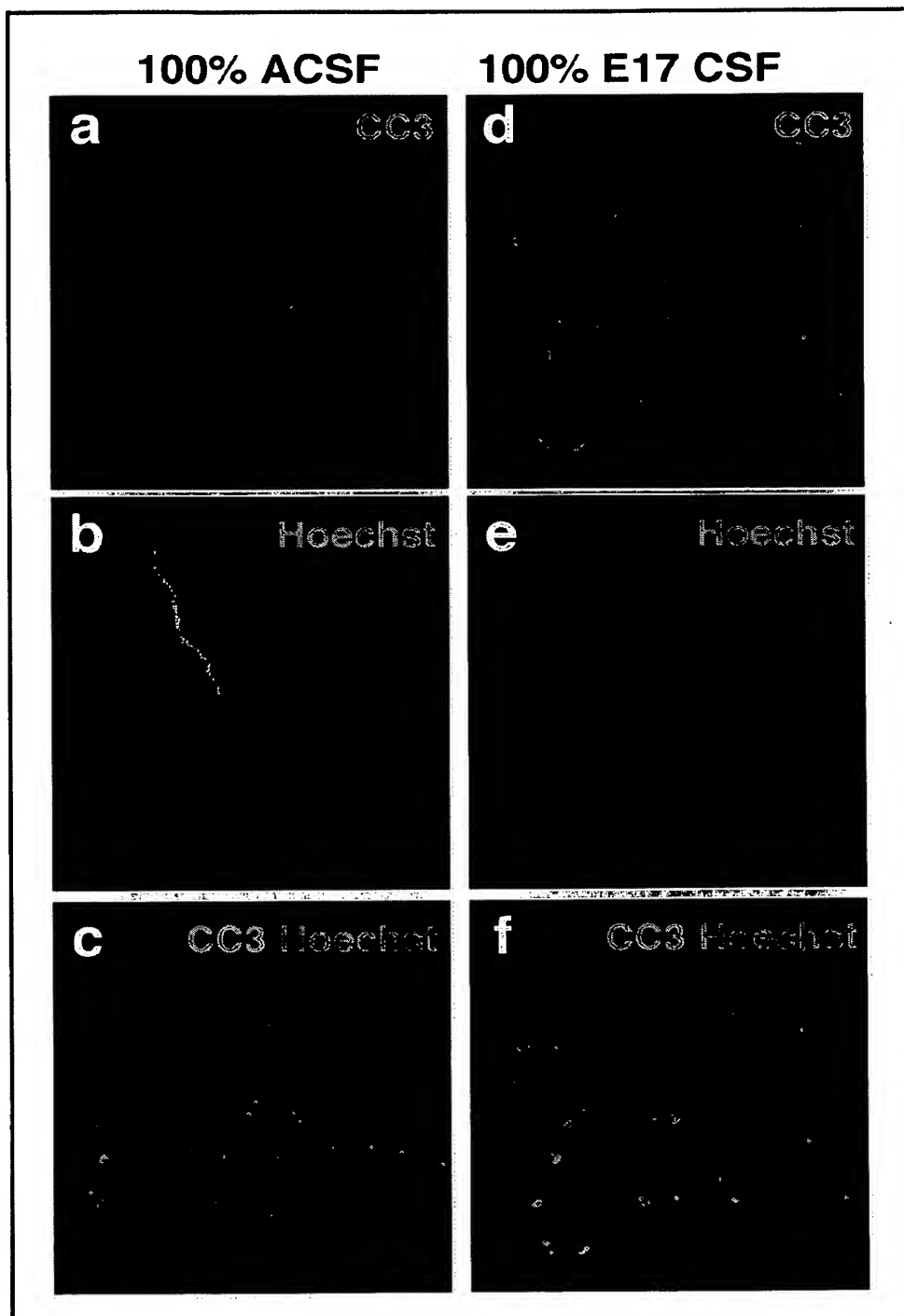
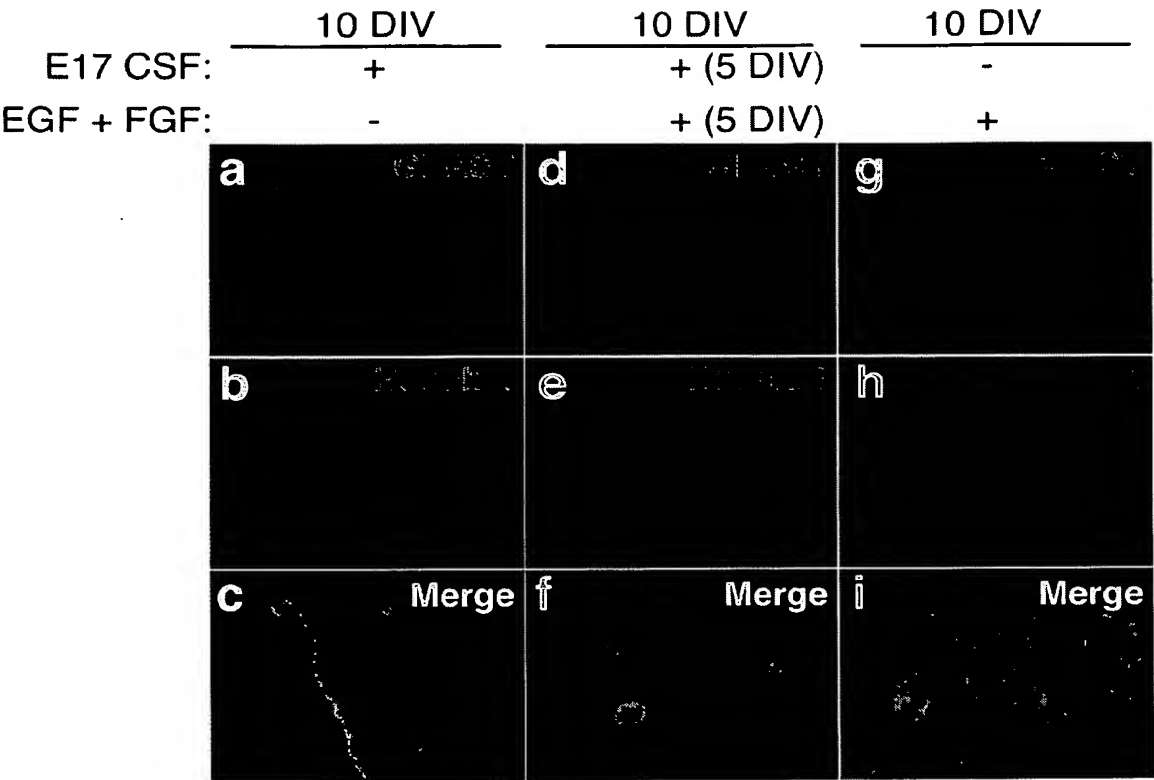
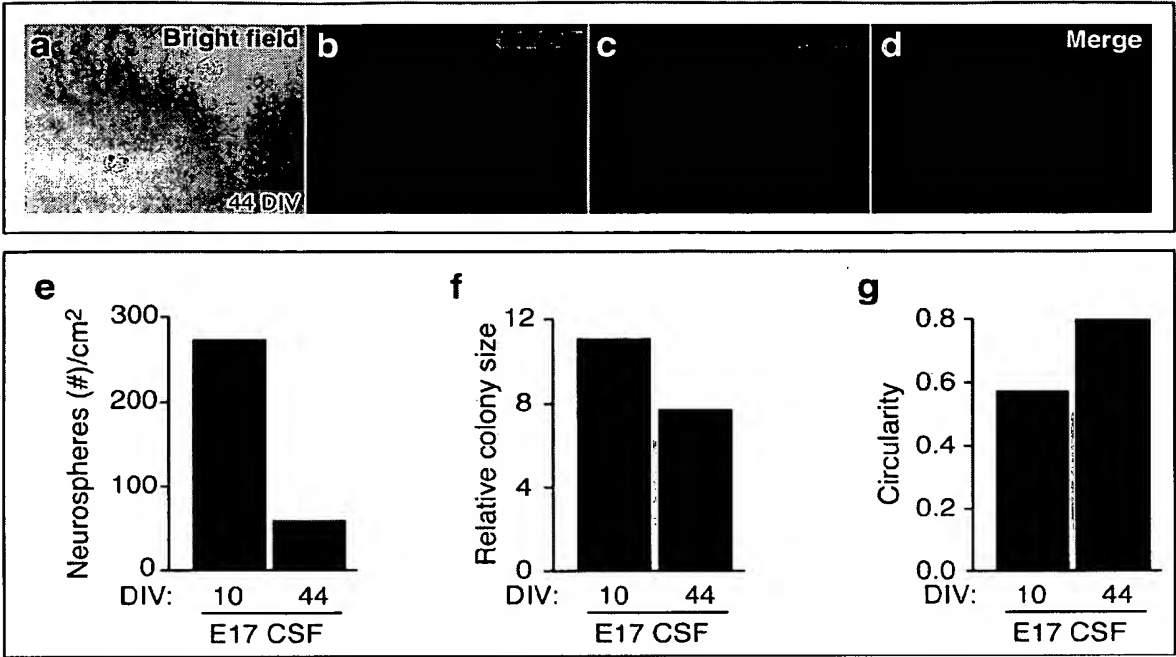


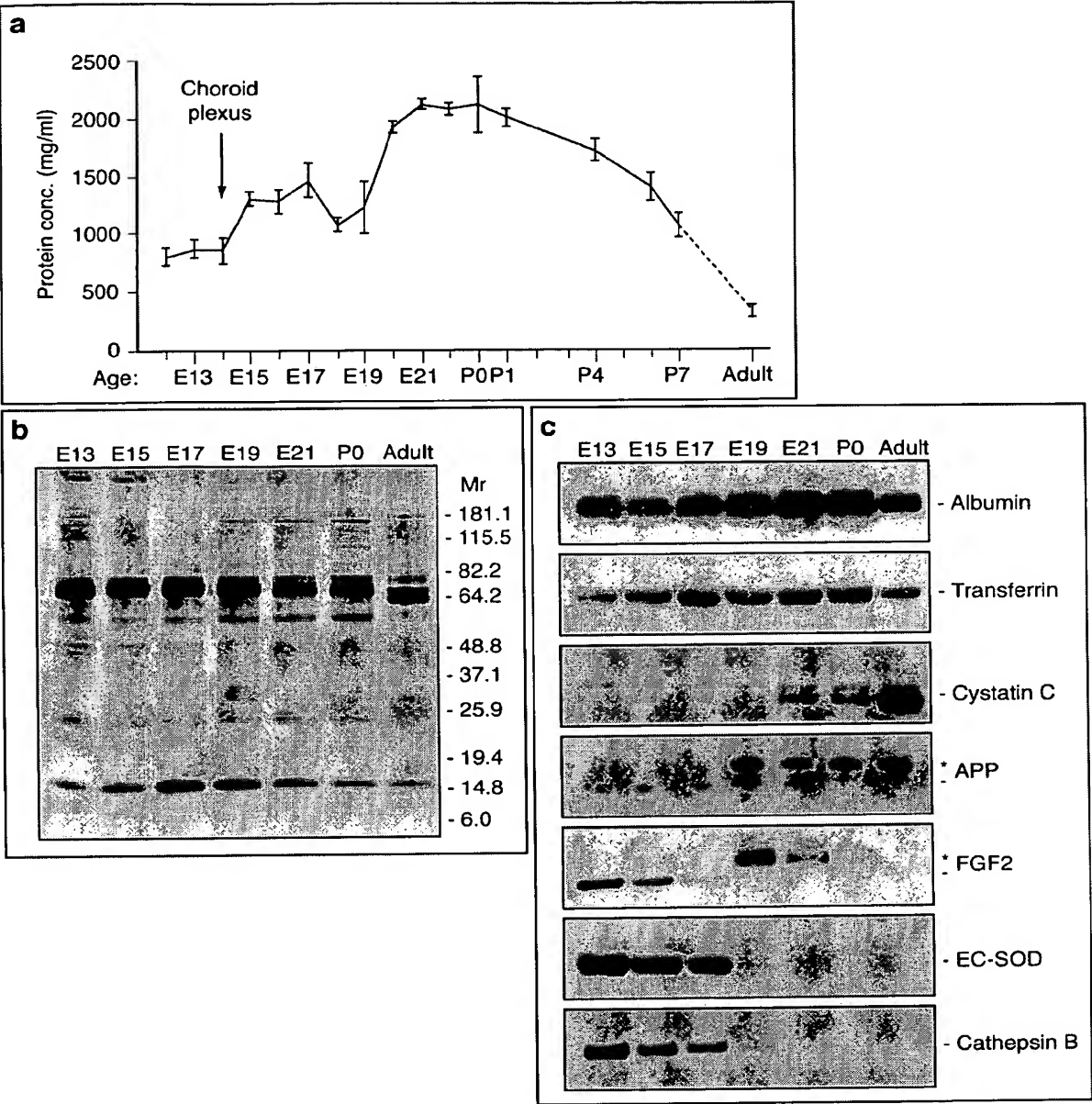
Figure 10A-10F



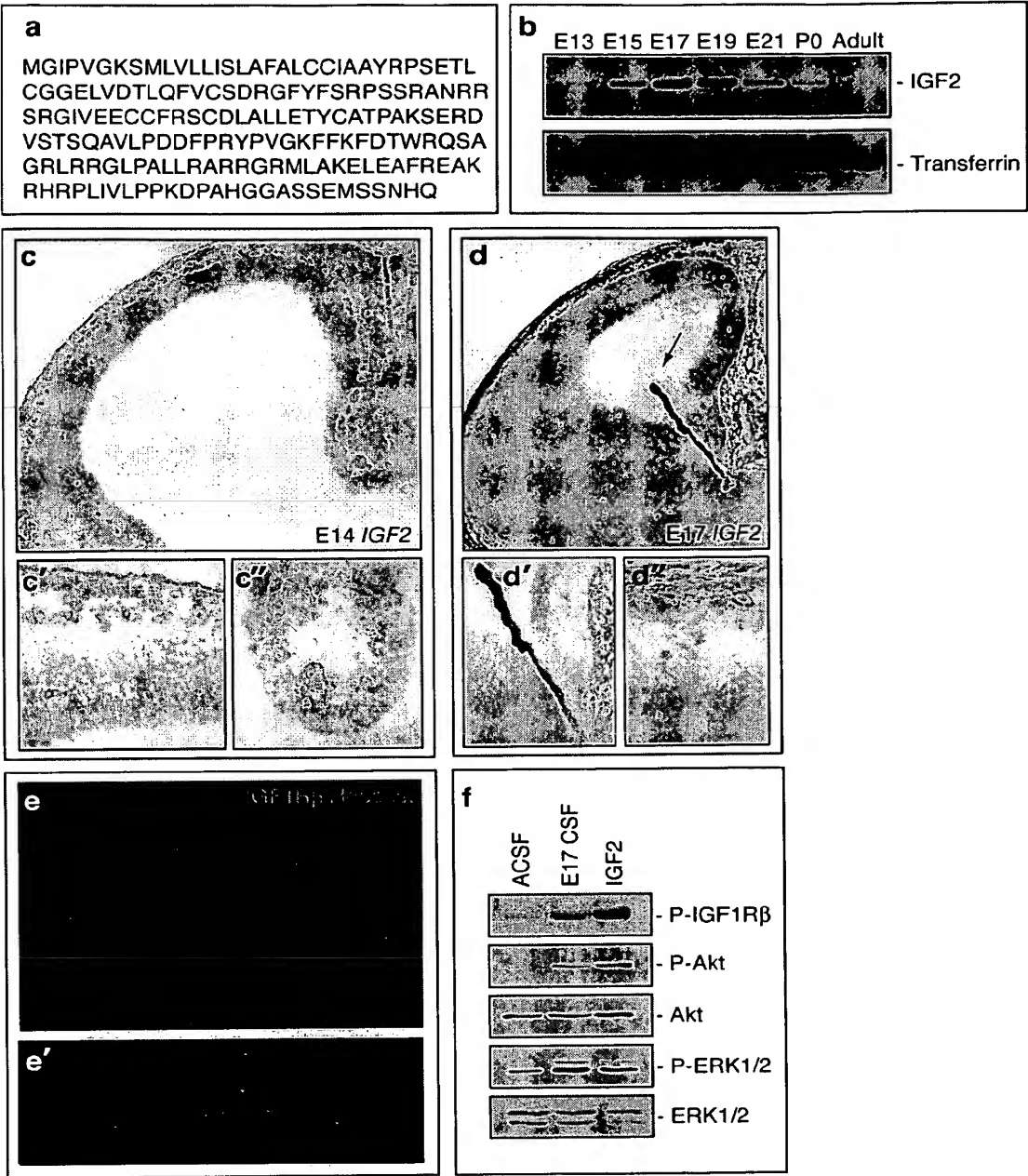
Figures 11A-11I



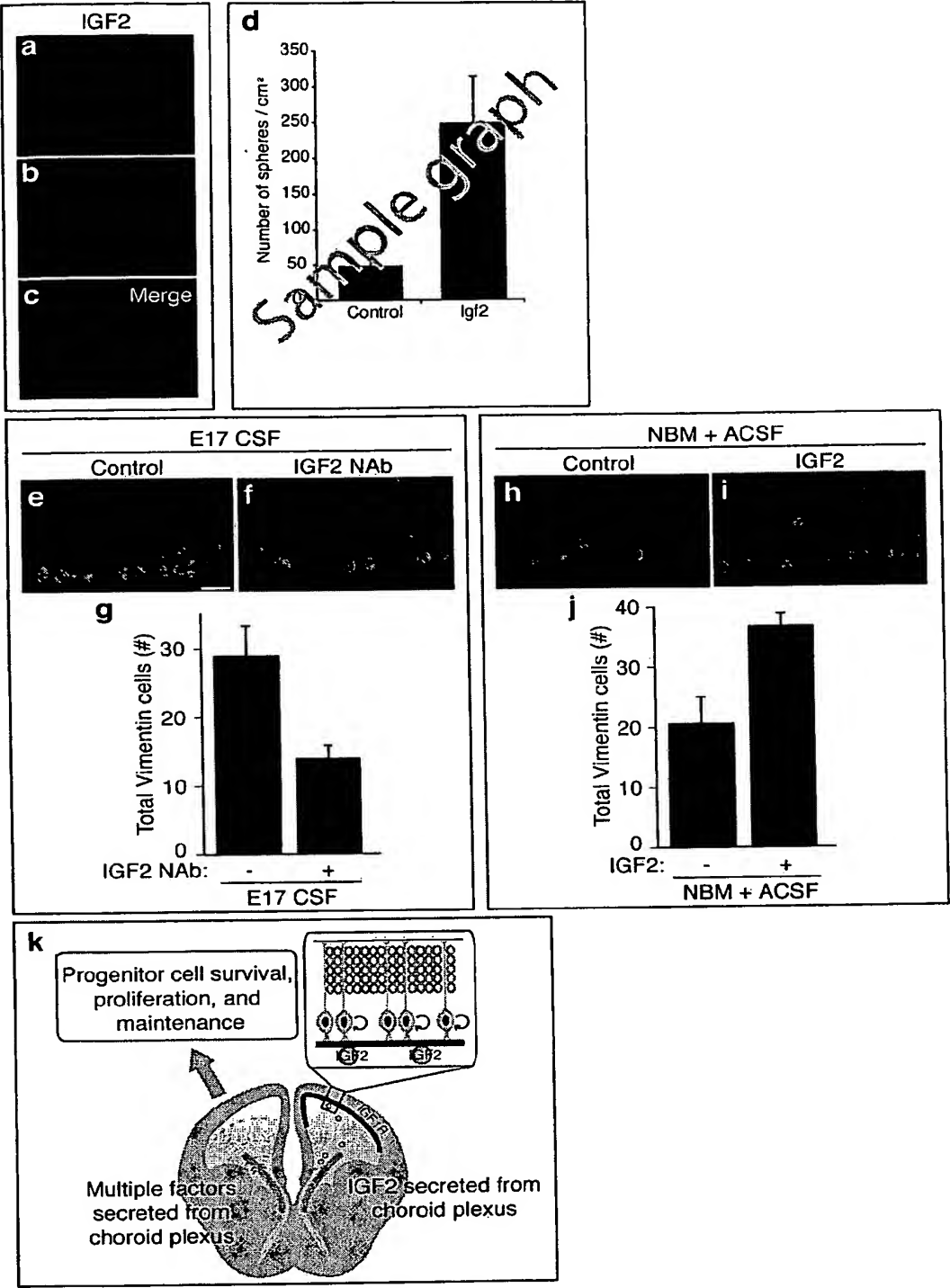
Figures 12A-12G



Figures 13A-13C



Figures 14A-14F



Figures 15A-15K